Quality Assessment of the Copper Compounds Through NPST With special reference to Tamra Sindura and Tamra Garbha Potalli.

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Article History: Received:10/7/23 Revised: 18/7/23 Accepted: 25/7/23

Abstract:

Background: *Rasashastra* is focuses on *Charturvida Rasayanas*. *Tamra Sindura* and *Tamra Gharba Pottali* are *Sagandha Rasayana*. *Tamra Sindhura* contains ingredients such as *Parada, Gandhaka,* and *Tamra*. It is indicated in *Rakta Vikruti janya Rogas, Yakrut, Pleeha Rogas, Apasmara, Visuchika, Amlapitta. Tamra Garbha Pottali* is effective in disease management associated with the *Kapha Pradhana Doshas.* To ensure the formulation quality and uniformity, standardization of ayurvedic formulation is necessary. Namburi Phased Spot Test is a simple analytical technique based on the principle of chromatography and test can be performed at basic laboratory setup. In the present study efforts are made to study and standardized color and pattern changes of both formulation at different time intervals.

Materials and Methods: *Tamra Sindura* (Sample A) and *Tamra Gharba Potalli* (Sample B) samples were taken and NPST study were carried out on different reacting papers to assess the purity and quality of both copper compound.

Observations and Result: Both samples were subjected to NPST as per CCRAS guidelines and observations were drawn at three different intervals of time duration.

Discussion: The NPST can be analyzed in three phases: the first phase is within five minutes of the treatment, the second phase is between five and twenty minutes later, and the third phase (beyond 20 minutes to some hours or even some days). Different compounds exhibit a wide range of colour and pattern differences based on the components present in them.

Conclusion: In the present study, *Tamra Sindura* and *Tamra Garbha Pottalli* provided data that fulfilled NPST standards.

Keywords: *Tamra Sindura, Tamra Garbha Pottalli,* Namburi Phased Spot Test.

DOI: 10.48047/ecb/2023.12.Si12.135

Introduction

Rasa Shastra is a branch of science which deals with metals, minerals, poisons, precious stones, aquatic origin substances. *Tamra* is one of the seven *Lohas* described in our ancient literature. The word *Tamra* was first discovered in the *Yajurveda* and *Atharveda.*[1] According to Modren Review the words "aes Cyprum" first appeared during the early Christian Era. In Roman writing about copper, because much of the metal at the time came from Cyprus. This Latin phrase is Anglicized as "coper."[2] *Charturvida Rasayanas* are backbone of *rasa shastra* and it includes *Kharaliya Rasayana, Parapati Rasayana, Pottali Rasayana* and *Kupipakva Rasayana*. *Rasayanas* are mainly help to achieve optimal physical strength, sense organ, *Dhatus* qualities, longevity, immunity or *Bala* and mental competence.

Kupipakva Rasayanas are the long-lasting progressive heat pattern, significant increase in drug potency, stability due to lattice energy, and immediate delivery of the enhanced bioavailability makes distinctive. *Kupipakwa Rasayana* has immense power to treat both acute and chronic illnesses, and it also has rejuvenating properties. *Tamra Sindura* is one of the preparations for Kupipakwa Sagandha, Bahirdhooma, Kanthastha Rasayana mainly explained in Ayurveda Sara Sangraha [4].

For simple administration and quick drug delivery, *Pottali Kalpanas* are excellent formulations because they are compactly shaped. The word *pottali* was used for a variety of purposes. The term *Puta* is used to minimise, concise, or make compact having *pratyaya,* and the word *Pottali* is formed from the root "*La"* with "*I*" *Pratyaya* meaning to take or receive.

Tamra Garbha Pottalli was prepared with *Tamra Bhasma*, *Kajjali*, and *Gandhaka* and comes under *Gandhaka Dravitha* type of *pottali.* The process was carefully performed in a safe area. General indications of *Tamra Garbha Pottalis kapha* predominant *tridoshaja* diseases, diseases of the respiratory system, senile debility caused by weakness of tissue systems, diseases related to alternate metabolism, diseases related to GIT. As a result, it might impact *Pranavahasrotas, Rasavahasrotas*, and *Annavahasrotas.*They may rapidly turn through the drug's pharmacokinetic stages of absorption, distribution, metabolism, and excretion. [5]

In the pharmaceutical industry, the end product's quality is crucial. Regulation authorities paid special attention to the quality of medicine and issued numerous guidelines for safety and quality due to the significant danger of damage to life and adverse effects on the human body. These analytical criteria provide important facts regarding the bioavailability of drugs and their effects on the body. These analytical techniques are more important in the formulation of medications. Analytical standards serve as the parameters for a product's assessment. A product must be characterized using an analytical description, especially in the modern era.

To identify *Bhasma* and *Sinduras,* the Chief Investigator of the Academy of *Ayurveda* created the Namburi Phase Spot Test. This procedure involves treating appropriate impregnated paper with a drop of solution under examination. This approach has the unique ability to study the same spot three times. This method is suitable for identifying the sample because it is reliable, reproducible, and consistent under the same parameters.[3] This test is used to evaluate both raw material and final product quality. In NPST, there will be discernible chain of chemical changes that are clearly detectable by the specific colour manifestation and changes in the pattern of spots with respect to different time intervals.

Aim: -

To assess the quality of *Tamra Sindura* and *Tamra Garbha Potalli* samples by NPST technique.

Materials And Methods:

1. *Tamra Sindura* was taken from GMP certified pharmacy.
2. *Tamra Garbha Pottalli* was taken from GMP certified pharmacy.
3. Preparation of *Tamra Garbha Pottali*
4. Preparation of Paper and solution for NPST.
5. Evaluation of NPST.

Materials[6]:

- 10% Pot iodide paper
- 5% Pot. Ferrocyanide paper
- Solution of 5N HNO3
- Solution of 20% HCl
- Distilled water
- Sample 1 - *Tamra Sindura*
- Sample 2 – *Tamra Garbha Potalli*
- Test Tubes.
- Test tube stand.
- Dropper

Method:

The "Phased Spot Test" analyzes the spot and colors over three different time intervals and three sequential phases.

Procedure:

Preparation of Reacting Papers: -

Reacting Paper, I: - 1gm of Potassium Ferrocyanide was mixed in 20ml of distilled water and solution was prepared. Then Whatman filter paper was taken and dipped in the solution. Then placed on dry glass sheet and dried.

Reacting Paper II: - Same procedure was repeated with 10% of potassium Iodide.

Preparation of Solution: -

- **Quantities of sample** – 250 mg (each)
- **Reagents-** 5N HNO3, 20% of HCl, Distilled water each 0.5ml
- **Time allowed to react** – 48 hours.

250mg of each sample were taken into test tubes and added with reagent 0.5 ml 5N HNO3.Test tubes were shaken and kept undisturbed for 48 hours to react with the reagents. Same procedure was conducted with reagent 0.5ml of 20% HCl and 0.5ml of Distilled water.

After 48 hrs, prepared solution was dropped with the help of dropper on 10% potassium iodide paper and 5% Pot. Ferrocyanide paper observed in three intervals of time, 1st phase at 0- 5 min 2nd phase at 5min - 20min, 3rd phase at 20 min – 24 hrs.

Observations and results: -

NPST analysis were carried out on *Tamra Sindura* with 5% of Pot. Ferrocyanide paper

Phases	**Sample 1 (TS + 5N HNO3)**	**Sample 2 (TS + 20%HCl)**	**Sample 3 (TS + Distilled water)**
1st Phase	A chocolate solid spot formed immediately and light blue margin encircled the entire spot with light yellow periphery	A chocolate spot formed and light blue colour encircled the entire spot with green periphery.	A light spot formed which was not demark able and light brown encircled the entire spot.
2nd Phase	Chocolate solid spot in centre and light blue encircled the entire spot with yellow periphery.	Blue spot in centre and light blue encircled the entire spot with dark green periphery.	Only yellow line seen in periphery with no centre spot.
3rd Phase	Chocolate solid spot in centre and light blue encircled the entire spot with dark green periphery.	Fade blue colour spot in centre and light blue encircled the entire spot with dark green periphery.	Fade light yellow line seen in periphery with no centre spot.

NPST analysis were carried out on *Tamra Sindura* with 10% of Pot. Iodide Paper.

Phases	**Sample 1 (TS + 5N HNO3)**	**Sample 2 (TS + 20%HCl)**	**Sample 3 (TS + Distilled water)**
1st Phase	A brown spot formed immediately and light blue margin encircled the entire spot with yellow periphery.	A brown spot in centre and light blue margin encircled the entire spot with yellow periphery.	No changes.
2nd Phase	A brown spot and light blue margin encircled the entire spot with yellow periphery.	A brown spot in centre and light blue margin encircled the entire spot with yellow periphery.	No changes.
3rd Phase	A brown spot in centre and light faded colour encircled the entire spot with light brown periphery.	No spot seen at centre and dark brown encircled the entire spot with light brown Periphery.	No changes.

NPST analysis were carried out on *Tamra Garbha Pottalli* with 5% of Pot. Ferrocyanide paper.

Phases	**Sample 1 (TS + 5N HNO3)**	**Sample 2 (TS + 20%HCl)**	**Sample 3 (TS + Distilled water)**
1st Phase	A navy-blue spot formed immediately at centre and light blue colour encircled the entire spot with light faded colour periphery.	A dark blue spot formed immediately at centre and light blue colour encircled the entire spot with green periphery.	A dark blue spot formed immediately at centre and light blue colour encircled the entire spot.

2nd Phase	A navy-blue spot at centre and light blue colour encircled the entire spot with light yellow colour periphery.	A dark blue spot at centre and dark blue colour encircled the entire spot with dark green periphery.	A dark blue spot at centre with light green periphery.
3rd Phase	A dark blue spot at centre and light blue colour encircled the entire spot with dark green periphery.	A dark blue spot at centre and light blue colour encircled the entire spot with dark greenish blue periphery.	A dark blue spot at centre and light blue colour encircled the entire spot with light yellow periphery.

NPST analysis were carried out on *Tamra Garbha Pottalli* with 10% of Pot. Iodide Paper.

Phases	**Sample 1 (TS + 5N HNO3)**	**Sample 2 (TS + 20%HCl)**	**Sample 3 (TS + Distilled water)**
1st Phase	A dark brown spot formed immediately with light brown margin encircled the entire spot.	A chocolate spot formed immediately and light faded cream colour margin encircled the entire spot with brown colour periphery.	A light brown spot formed immediately with light blue periphery.
2nd Phase	A dark brown spot and light faded cream colour margin encircled the entire spot with light brown colour periphery.	A dark brown spot and light faded cream colour margin encircled the entire spot with light brown colour periphery.	Light fade spot at centre with light brown periphery.
3rd Phase	A brownish black spot and light faded cream colour margin encircled the entire spot with light brown colour periphery.	Brownish black spot at centre light faded cream colour margin encircled the entire spot with dark brown periphery.	Light fade spot at centre with light brown periphery.

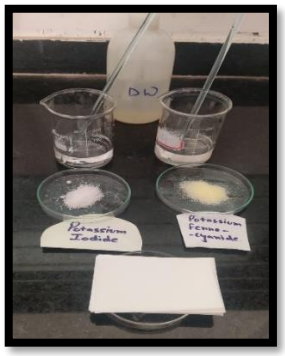

Figure: 1 Reagents and whatman filter paper

Figure: 2 Reacting Papers

Figure 3: NPST stand

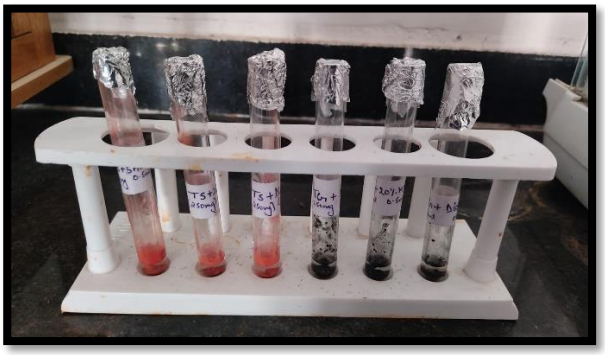

Figure 4: Settling of solutions

Fig- 5. **NPST analysis were carried out on *Tamra Sindura***

Figure: 5, Sample A at 1st Phase Sample A at 2nd Phase Sample A at 3rd Phase

Fig- 6. **NPST analysis were carried out on *Tamra Garbha Pottali***

Figure: 6, Sample B at 1st Phase Sample B at 2nd Phase Sample B at 3rd Phase

DISCUSSION: -

Three categories of *Ayurvedic Aushadis* can be made: 1. *Kastha Ausadhi* (Herbal preparations) 2. *Rasa Ausadhis* (Metallic Preparation) 3. *Jangama Aushadis* (Animal preparations). Various *Samskaras* are performed on these drugs in order to convert them into medicines. Methods are used to make the *rasa dravyas*, particularly *Shodhana, Marana*, and others, suitable for internal administration. The metals/minerals intended for the *marana* process are known as primary metals, while other drugs used in small amounts as a *marana* media of primary metal are known as secondary metals. Certain secondary metals used as media during the Marana process, such as mercury and its compounds, will amalgamate and aid in the disintegration of the particles without exposing their existence in the final result. NPST is the only qualitative analytical test that identifies products based on *Rasa Shastra* names such as *Kajjali marita bhasma*, *Gandhaka marita bhasma*, and so on. NPST is a simple, inexpensive, and quick test that can be performed in a basic laboratory setup without the need for a skilled individual.[7] Traditional tests, such as *Bhasma Pariksha*, are based on physical qualities and do not specify *bhasmas* chemically; however, because the NPST is based on chemical reactions, specific *bhasmas* are denoted chemically. Different compounds exhibit a wide range of colour and pattern differences based on the components present in them. Because the colour and pattern of any bhasma are different based on the type of puta used and the number of putas provided, the NPST test also aids in detecting optimal bhasma production. The chemicals used to prepare the trail drug solution are chosen based on component solubility. Because of their solubility, eg- Conc. HNO3, Aquaregia, and HCl are used for the Mercury compound. The compound is identified by NPST based on the specific name mentioned in the classics. For example, *Kajalli marita Tamra Bhasma. Marana of Rasa dravyas is performed in Rasa Shastra utilizing one of four media: Kashta Aushadis, Arilohas, Gandhaka, Rasa, or Rasa compounds.*[6] According to the classics, *bhasma* prepared with mercury or mercury compounds is considered *Shrestha*. The reason for this is that mercury used in marana aids in finer particle disintegration, improves pharmacodynamics and pharmacokinetics of the drug, reduces the number of *putas*, and its residue is not present in the final product. Because the price of mercury is high, other media may be used in some market samples under the label of kajjali marita tamra bhasma. The colour and pattern acquired in NPST for kajjali marita tamra bhasma and other media would be different, verifying the product's legitimacy. *Tamra* is the third *Suddha Loha*. For the goal of hardening minerals for therapeutic use, acharyas created a unique procedure known as *Kupipakava* and *Potalli Kalpana*. Since the trade is misusing the code of conduct and marketing spurious formulations, it is necessity to establish scientific standards for them has become urgent. NPST is a technique that helps to ensure the formulation quality and

uniformity, Standardization of ayurvedic formulation is necessary. Also known as Descending Chromatography Technique which also helps to analysis the specific gravity of samples. The NPST can be analyzed in three phases: the first phase, or the immediate reaction, is within five minutes of the treatment, the second phase, or the delayed reaction, is between five and twenty minutes later, and the third phase, or the late reaction (beyond 20 minutes to some hours or even some days). In this study 5% of Pot. ferrocyanide and 10% of Pot. Iodide reacting papers are used. Depending on the sample, the colour and spot pattern of just one of the mentioned three phases are typically quite distinctive and the examiner must take note of any changes that occur during the three stages or over the course of time. *Tamra Sindura* and *Tamra Garbha Pottali*'s references are not available, we can use *Tamra* Group as a benchmark and study's findings.

CONCLUSION: -

In this study, the purity and quality of the *Tamra Sindura* and *Tamra Garbha Pottalli* samples were evaluated using NPST test. A minimal amount of setup and requirements are needed to complete this test. In order to ensure that *bhasma* is of a high standard before being applied therapeutically, CCRAS has also accepted the NPST monograph. The present study showed that *Tamra Sindura* and *Tamra Garbha Pottalli* provided data that fulfilled NPST standards.

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