Tuttha Bhasma Prepared by Two Different Methods: A Pharmaceutico-analytical Study

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Abstract:-Introduction: This research study focuses on the standardization and chemical characterization of Tuttha Bhasma, an essential component of Ayurvedic medicine. Tuttha, a mineral substance, is utilized for its therapeutic properties but requires purification before use to prevent adverse effects. The study aims to standardize two distinct preparation methods (Method A and Method B) for Tuttha Bhasma following traditional procedures and assess their chemical properties for potential therapeutic efficacy.

Materials and Methods: Raw materials including Tuttha, Nimbu, Lakucha, Shodhit Gandhaka, and Shodhit Tankana were procured and used in the preparation processes. The study involved Nirmalikarana (cleansing), Tuttha Shodhana (purification), and Tuttha Marana (incineration) through both methods. Organoleptic tests and Bhasma Pariksha tests were conducted alongside modern atomic absorption spectroscopy to analyze Tuttha Bhasma's physical characteristics and chemical composition.

Results: Tuttha Bhasma prepared using both methods and passed classical Ayurvedic tests, indicating successful preparation. Analysis revealed substantial changes in chemical composition during Tuttha Bhasma preparation. Method A exhibited a significant increase in copper content (65.85%) while Method B displayed elevated copper (67.23%), sulfur (8.51%), and iron (1.76%) levels. Method B's Tuttha Bhasma exhibited higher proportions of macro- and microminerals.

Conclusion: The study successfully standardizes Tuttha Bhasma preparation methods and characterizes their chemical properties. Both methods yield Bhasma conforming to classical Ayurvedic tests, indicating their potential efficacy. Method B, involving Gandhaka and Tankana for Marana, results in Tuttha Bhasma with enhanced mineral content, suggesting greater therapeutic potential. These findings contribute to the advancement of Ayurvedic medicine, offering standardized Tuttha Bhasma preparation methods and insights into its chemical composition for future therapeutic exploration.

INTRODUCTION

Tuttha is one of the *Maharasas*. *Tuttha* is known by the names *Tutthaka*, *Tutthanjana*, *Mayuraka*, *Sasyaka*, *T amragarbha*, *Sikhigriva*, *Amritasanga*, and *Kharparika* in *Ayurveda*.[1] It is administered in many formulations such as *Vati*, *Vatika*, *Gutika*, *Leha*, *Varti*, *Anjan*, *Ghrta*, *Dr ava*, *Malahara*, *Mudrika*, and Potali in the form of incinerated "*Bhasma*," purified, or added to herbal or herbomineral formulations.[2] According to the author of *Rasa Jalanidhi*, *Sasyaka* occurs naturally while *Tuttha* is prepared artificially. They can be used interchangeably for one another.[3] Impure *Sasyaka* and *Tuttha* cause vomiting and giddiness. Therefore, it needs to be purified before administration. *Shodhit Tuttha* should not cause *Vanti* (vomiting) and *Bhranti* (giddiness) after internal use.[4]*Tuttha Bhasma* is *Lekhana* (scrapping action), *Bhedi* (purgative), *Kashaya* (astringent) in taste, *Madhura* (sweet) in *Vipaka* (digested taste), and *Laghu* (light) in quality. It acts as *Krumighna* (anti-helminthic), *Chakshusha* (Good for eyes), *Mehamedohar* (diabetes and urinary disease and obesity), *Tvakdosahara*, *Rucikara*, *Rechaka*, *Nadibal akaraka*, *Vanhikarana*, and *Vayasthapaka*. Its *Dosha Prabhava* is *Kaphapittahara*.[5] The purification of *Tuttha* and its transformation into microfine particles with regard to *Tuttha* specifically are not given significant emphasis throughout the *Samhita* period. However, subsequently, in the 19th century, *Rasa* text known as *Rasajalanidhi* replaced it with *Tuttha*, an artificial preparation. Another well-known *Rasasastra* literature, *Rasatarangini* by Sadananda Sharma, describes in detail how *Tuttha* is purified, incinerated, and offered pharmacological effectiveness. Many texts were written during the *Rasasastra's* transitional period, between the 8th and 20th centuries AD, and they indicate

that *Tuttha* was used therapeutically more often following purifying and incineration procedures.

The classical *Rasa* literature does not describe the criterion for selecting the *Tuttha* samples. Only *Sasyka Grahya Laksanas* that come from natural sources have color like the peacock's neck (*Sikhikanthasamucchya*), are heavy (*Guru*), are unctuous (*Snigdha*), and are bright (*Mahaujjval*). *Sasyaka* is rarely available; hence artificially prepared *Tuttha* was taken into consideration for this study.

AIMS AND OBJECTIVES

1. Standardize the two preparation methods of *Tuttha Bhasma* in accordance with the standard operating procedures (SOPs) described in traditional texts
2. Chemically characterize the *Tuttha Bhasma* preparations using the prescribed SOPs to ensure consistency and providing insights into its standardization and chemical characterization.

MATERIALS AND METHODS

The study comprises two distinct phases. First, a pharmaceutical study was conducted to prepare the drug, followed by an analytical study carried out during the preparation process and at its final endpoint.

Selection and procurement of raw materials

The raw material *Tuttha* (500 g) was procured from local market. It was sent to a chemistry laboratory for cross-verification. After a confirmation by chemist on *Tuttha*, it was selected for the study. *Nimbu* (*Citrus medica* L.) and *Lakucha* (*Artocarpus hirsutus Lam*.) were collected from local market and *Shodhit Gandhaka* and *Shodhit Tankana* were procured from the department of *Rasashastra*.

Nirmalikarana of Tuttha

It is a type of *Sodhana* process. Procedure is explained in *Rasa tarangini* to remove external blemishes from *Tuttha* 1:2 ratios of *Tuttha* and hot water was taken for making solution for *Nirmalikaran* process as it was yielding more *Tuttha* after crystal formation.

Procedure

Raw *Tuttha* (500 g) was taken and pulverized in a *Khalvayantra*. Then, boiling water (1000 mL) was added to a steel jar with powdered *Tuttha* to dissolve it. When the solution was dissolved, it was filtered through filter paper in a glass jar before being let to cool for around 4 h at room temperature. After 5 min, *Tuttha* crystals began to form at the base of the glass vessel. The materials were then allowed to dry under shade. *Tuttha* crystals' weight after *Nirmalikaram* was 400 g.

Observations

Following filtering, the filter paper contained a blackish-colored residue. The color of *Tuttha* changed from royal bright blue to dark greenish blue/blue with green tinge. Bitterness was reduced slightly. The nature of crystals changed from rough, hard to smooth, and brittle.

Tuttha shodhan

Shodhan of *Tuttha* was done according to the process mentioned in the text *Rasatarangini*.[1]

Materials

Nirmalikrta Tuttha was taken (400 g), Bijora *Nimbu swarasa*:-100 mL.

Procedure

Nirmalikrta Tuttha powder was placed in a *Khalvayantra* and 100 mL of *Bijora nimbu* (*C. medica* L.) *Swarasa* was then poured over the powder to properly moisten it. Trituration was done with constant pressure. After around 2 h, when the *Nimbu Swarasa's* wetness had reduced, enough *Nimbu Swarasa* was once again added, and trituration was carried out for another 6 h. After allowing it to dry, it was collected and measured it was 422 g. There was gain of weight of 22 g during *Shodhana*. A total of 6 h time was required to complete *Shodhana*.

Observations

Color of *Tuttha* changed from dark greenish blue to dull greenish blue after *Shodhan*. Smell of lemon was observed in *Shodhit Tuttha*.

Tuttha Marana

Shodhita Tuttha was divided into two equal parts of 200 g each and *Marana* was done by two different methods as follows.

1. By giving *Bhavana* of *Bijora Nimbu Swarasa* (*C. medica* L.), followed by *Laghuputa* (*Tuttha Bhasma* – Method A)
2. By the addition of *Shodhit Gandhaka*, *Shodhit Tankana*, and *Bhawana* by *Lakucha Swarasa* (*A. hirsutus Lam*.), followed by *Laghuputa* (*Tuttha Bhasma* – Method B).

Tuttha Bhasma - Method A

Bhasmikaran of *Shodhita Tuttha* was done by the process mentioned in *Rasa Tarangini*.[1]

Materials

Shodhita Tuttha: - 200 g, *Bhavana dravya* - *Nimbu Swarasa*:-Q.S.

Procedure

In a *Khalvayantra*, *Tuttha* was taken, ground into a powder, and then triturated with enough *Nimbu swarasa*. Trituration was continued until it reached a viscous and semisolid form. The circular *Chakrikas* were made with a 3 cm diameter and a 0.5 cm thickness and they were then dried under shade. Dried *Chakrikas* were kept in *Sharavasamputa*. Twenty cakes made of cow dung were used to give *Laghuputa* (each cow dung cake weighing about 200 g). Cow dung cakes were lit and placed below, above, and all around the *Samputa*. Following *Svangasita*, *Saravasamputa* was removed, and layers of soil-smeared fabric were meticulously scraped off with a knife. After that, *Chakrikas* from the *Sharava* were gathered, weighed, and ground. The weight of the drug after 1st*Laghuputa* was 132 g. It required two more *Puta* to form a *Varitara Bhasma*. Each time *Bhavana* of *Nimbu Swarasa* was given and the same procedure was followed as mentioned in the first *Puta*. The weight of *Bhasma* after the 2nd*Laghuputa* was 112 g and the weight of *Bhasma* (*Tuttha Bhasma*–A) after the 3rd*Laghuputa* was 100 g. A total of three such *Laghuputa* were given.

Observations

After the first and second *Puta*, the material received was brittle which became smooth, very soft powder following the third *Puta*. *Tuttha Bhasma*–A, passed all the classical *Bhasma Pariksha*. The results are as mentioned in Table 1. Color after the first *Puta* was dark bluish black, which becomes light bluish black and finally, after the third, *Puta* becomes grayish black.

Parameter	*Tuttha Bhasma A*	*Tuttha Bhasma B*
Shabda	Absent	Absent
Sparsha	Soft	Soft
Roopa	Greyish black	Black
Rasa	Tasteless	Tasteless
Gandha	Nonspecific	Not specific
Snigdhatwa	Alpa snigdha	*Alpa snigdha*
Nischandratwa	No metallic luster	No metallic luster
Rekhapurnatwa	Present (it fills between the creases of fingers)	Present
Varitaratwa	Present	Present
Avami	Present	Present
Dadhi pariksha	Absent (unreactive - no discoloration in *Amla Dravya* is seen)	Absent (unreactive)
Apunarbhava	Present	Present

Table 1:

Organoleptic characters and *Bhasma pariksha* of *Tuttha Bhasma* A and B

Tuttha Bhasma–Method B

Materials

Shodhita Tuttha:-200 g, *Shoditha Gandhaka*-200 g, *Shoditha Tankana*-200 g *Bhavana dravya*-*Lakucha* (*A. hirsutus* Lam.) *Swarasa*-*Q.S.*

Procedure

Shoditha Tuttha, *Shoditha Gandhaka*, and *Shoditha Tankana* were taken in equal amounts (200 g) and well mixed in a suitable *Khalwayantra*. *Lakucha* (*A. hirsutus* Lam.) *Swarasa* was added in an adequate amount, the grinding process was continued, and *Chakrika* was prepared. The prepared *chakrikas* were dried under shade. The color of the *Chakrikas* slightly changed to cyan blue. It took 2–3 days for complete drying of *Chakrikas*. Each dried *Chakrika* weighed between 3 and 5 g. All of the dried *Chakrikas* were put in a clean *Sharava*, and the *Kukkutaputa* was given after *Sandhibandhana*. The acquired sample was taken after *Swanga Sheeta*, and ground and weighted. *Bhasma Parikshas* were then carried out. The weight of the drug after 1st*Laghuputa* was 144 g. It required two more *Puta* to form a *Varitara Bhasma*. Each time *Bhavana* of *Lakucha Swarasa* was given, an equal amount of *Shodhit Gandhaka* was added, and the same procedure was followed as mentioned in the first *Puta*. The weight of *Bhasma* after the 2nd*Laghuputa* was 103 g and the weight of *Bhasma (Tuttha Bhasma*–A) after 3rd*Laghuputa* was 95 g. A total of 3 *Laghuputa* were given.

Observations

After the first and second *Puta*, the material received was brittle which becomes smooth, very soft powder following the third *Puta*. *Tuttha Bhasma*–B passed all the classical *Bhasma Pariksha*. Color after the

first *Puta* was grayish blue which becomes brownish black and finally, after the third, *Puta* becomes black.

DISCUSSION AND RESULTS

Around the 19th century, the artificial preparation of *Tuttha* was started. Academic research also reveals the crucial significance that metal preparations have had in *Ayurvedic* medicine since its inception.[6] They developed certain pharmacological practices, such as S*hodhana* and *Marana*, which are significant in mineral detoxification and enhancing their medicinal potential. [7] In the purifying and incineration processes, the reduced metal must be combined with herbal components that have a special role to play in the process of disease pacification.

Nimbu swarasa was used in *Tuttha Shodhana*. Since lemon juice has inherent detoxifying capabilities; this procedure may have assisted in detoxifying *Tuttha* and improving its medicinal quality. Citrus or lemon fruits are well recognized for their antibacterial and antifungal properties, antioxidants, and nephrolithiasis-fighting properties.[8] These are a significant source of polymethoxylated flavones and flavonones,[9] which seem to be rare in other plants.

The organoleptic study exhibited distinct color transformations during *Tuttha's* conversion into *Bhasma*. These color changes could be indicative of the evolving chemical composition and properties.

The quantitative analysis utilizing AAS provided crucial insights into the chemical composition of *Tuttha Bhasma* prepared through two different methods. The variations in copper, sulfur, and iron content among different *Tuttha* forms reflect the intricate chemical transformations during preparation.

Notably, the copper content showed a substantial increase in both *Tuttha Bhasma* preparation methods. Method A exhibited a 65.85% rise in copper content, while Method B demonstrated a 67.23% increase. This enhancement could signify the potential for improved therapeutic efficacy attributed to increased copper content.

The sulfur and iron content changes were also significant. In Method A, sulfur increased by 8.87% and iron by 1.53%, whereas in Method B, sulfur increased by 8.51% and iron by 1.76%. These variations suggest the intricate interplay of chemical reactions and transformations during *Tuttha's* incineration.

Analysis of *Tuttha Bhasma* prepared using Method B shows the presence of sodium (4.87%), which may be a result of the components used as *Tankana*. The weight of the prepared *Tuttha Bhasma* was over 80% lower than the raw *Tuttha* in Method A and 81% lower in *Tuttha* method B of *Tuttha Bhasma*.

The study successfully standardized two *Tuttha Bhasma* preparation methods following traditional texts' SOPs. This achievement ensures consistency in the preparation process, enhancing the reproducibility and reliability of *Tuttha Bhasma* across different contexts.

Different *Ayurvedic* tests demonstrate the accuracy of both methods of *Tuttha Bhasma* preparation. As in the preparation of *Tuttha Bhasma* by Method B, there is the addition of *Shodhit Gandhaka* and *Shodhit Tankana*, does it change the antimicrobial spectrum will be a scope for further research. The final validation of *Tuttha bhasma's* effectiveness on patients may benefit from more Phases 2 and 3 studies, produced with different methods.

CONCLUSION

Prepared *Tuttha Bhasma* cleared physical as well as physicochemical tests mentioned in *Ayurvedic* literature. AAS provided crucial insights into the chemical composition of *Tuttha Bhasma* prepared through different methods. The variations in copper, sulfur, and iron content among different *Tuttha* forms reflect the intricate chemical transformations during preparation.

Characterization study revealed that *Tuttha Bhasma* prepared by Method B (*Gandhaka* and *Tankana Marita*) has more proportion of macro- and microminerals than that prepared by Method A, and hence might be more effective therapeutically.

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