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ROLE OF *SHODITHA GANDHAKA* AND *NIMBU SWARASA* IN THE PHARMACEUTICAL TRANSFORMATION OF *NAGA BHASMA*

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ABSTRACT

Rasashastra is the specialized branch of *Ayurveda* which deals with metals, minerals and herbo-minerals. *Bhasma* is a unique *Ayurvedic* formulation derived from metals through a process of incineration, resulting in fine calcined particles. Among the metals classified in *Dhatu Varga*, *Naga* (Lead) is categorized under the *Putiloha* group. The safe and effective transformation of *Naga* into non-toxic *Bhasma* demands thorough preparatory and processing steps highlighted in the classics. The present study describes a systematic pharmaceutical preparation of *Naga Bhasma* involving three stages- *Shodhana* (Purification) of *Naga* using *Churnodaka. Jarana* with *Shodita Manashila* and *Marana* (Incineration) with *Shodita Gandhaka* and *Nimbu Swarasa*. *Marana* was performed for 10 cycles in muffle furnace maintaining 450^0C to 500^0C temperature. *Gandhaka* plays a dual role as a detoxifying agent and critical reactant enabling sulphide bond formation with lead, converting toxic metallic lead into pharmaceutically acceptable lead sulphide complexes. *Nimbu Swarasa*, rich in citric acid and ascorbic acid, acts as a *Bhavana Dravya* facilitating uniform trituration, particle size reduction, and enhancement of bioavailability. The resultant *Naga Bhasma* exhibited a characteristic jet-black colour resembling *Kajjali*, and satisfactorily passed classical *Bhasma Pareeksha* including *Varitaratva*, *Rekhapurnatva*, *Slakshnatva*, and *Unnama Pareeksha*. This study underscores the indispensable pharmaceutical significance of *Gandhaka* and *Nimbu Swarasa* in rendering *Naga* safe and therapeutically effective.

KEYWORDS: *Naga bhasma, Gandhaka, Nimbu Swarasa, Shodhana, Marana,* Lead.

INTRODUCTION

Marana (incineration) is a pharmaceutical procedure employed in conversion of metal into *Bhasma* which is the stable and assimilable form. The *Purva Karma* of *Naga Marana* involves Stage 1, *Shodhana* involves *Dalana* procedure of *Ashudha Naga* with *Churnodaka* for seven times. This process removes the surface impurities, oxidizes the Lead and initiates detoxification. Followed by Stage 2, *Jarana* performed with *Shodita Manashila* to obtain *Jarita Naga* in powder form which facilitates subsequent *Marana* process. The *Pradhana Karma* involves *Bhavana* with *Shodita Gandhaka* and *Nimbu Swarasa* leading to formation of *Chakrika*. This is thoroughly dried and arranged in the *Sharava*. *Sandhibandhana* is done to the *Sharava Samputa* and kept in the muffle furnace for *Puta*. The temperature is gradually increased from 50^{0C} till 450^{0C} and maintained for an hour at this maximum temperature, allowed for *Swangasheeta* and collection of contents of *Naga Bhasma*. *Naga Bhasma* is classically indicated in *Prameha, Kushta, Krimi* and *Netraroga*.

The present paper aims to highlight the unexplored pharmaceutical preparation of *Naga Bhasma* with *Shodita Gandhaka* and *Nimbu Swarasa* and testing *Naga Bhasma* by classical *Bhasma Pareeksha*.

MATERIAL AND METHODS

1.1 Collection of the Raw Materials

Ashudha Naga, *Ashudha Gandhaka* were procured from Amrut Kesari Depot Bengaluru. *Ashudha Manashila* was procured from authenticated *Ayurveda* suppliers, Chennai.

1.2 Preparation of *Churnodaka*[1]

Sudha Churna was added to fresh water and was allowed for overnight. For about 2.5 L of *Churnodaka* was used for each cycle of *Shodhana* of *Naga*.

1.3 *Shodhana* of *Naga*[2]

Ashudha Naga was taken in *Darvi Yantra* and melted under mild fire. The molten *Naga* was quenched in *Churnodaka* through *Pitara Yantra*. *Naga* was taken out of *Churnodaka* and was allowed to dry. This process was repeated for 7 cycles.

Table 1: Details for *Naga Shodhana.*

SL No	Ingredients	Before *Shodhana*	After *Shodhana*
1.	*Ashudha Naga*	511gm	535gm
2.	*Churnodaka*	2.5L	

1.4 *Shodhana* of *Manashila*[3]

Ashudha Manashila was pounded in *Khalwa Yantra*, to this *Ardraka Swarasa* was added and procedure of *Bhavana* was carried out till the *Subhavita Lakshana*. This was repeated for 7 cycles.

Table 2: Details of *Manashila Shodhana.*

SL No	Ingredients	Before *Shodhana*	After *Shodhana*
1.	*Ashudha Manashila*	500gm	556gm
2.	*Ardraka Swarasa*	Qs	

1.5 *Jarana* of *Shodita Naga* with *Shodita Manashila*[4]

Shodita Naga was taken in iron *Kadai* was allowed to melt, *Shodita Manashila* was added little by little and was rubbed with a ladle. This process was carried out till the addition of complete quantity of *Manashila*. This procedure resulted *Jarita Naga* in powder form.

Table 3: Details of *Jarana* of *Naga.*

Sl No	Ingredients	Quantity	*Jarita Naga*
1.	*Shodita Naga*	535gm	625gm
2.	*Shodita Manashila*	535gm	

1.6 *Shodhana* of *Gandhaka*[5]

Bhudhara method of *Shodhana* was employed. *Ksheera* was taken in mud pot covered with gauze piece. *Ashudha Gandhaka* was spread on the gauze piece and closed with *Sharava* and *Sandhibandhana* was done.

Table 4: Details of *Gandhaka Shodhana.*

SL No	Ingredients	Before *Shodhana*	After *Shodhana*
1.	*Ashudha Gandhaka*	500gm	496gm
2.	*Ksheera*	2L	

1.7 Extraction of *Nimbu Swarasa*

Fresh, mature lemons of good quality were procured and cleaned thoroughly with water. *Nimbu Swarasa* (fresh lemon juice) was extracted and filtered through a double-layered muslin cloth to remove pulp and seeds.

1.8 *Marana* of *Naga*[6]

Jarita Naga was taken in *Khalva Yantra*, to this *Shodita Gandhaka* and *Nimbu Swarasa* was added and made in *Chakrika* and allowed to dry and shifted to *Sharava*. *Sandhibandhana* was done was subjected to *Puta* in Muffle Furnace at 450^{0C}-500^{0C}. For each *Puta*, the temperature was raised gradually from ambient (approximately 50°C) to the target temperature at a controlled rate, maintained at the target temperature for one hour, and then allowed to cool to room temperature naturally before opening the furnace. After each *Puta*, the material was removed, re-triturated with *Nimbu Swarasa (Bhavana)*, re-formed into *Chakrika*, and subjected to the next Puta cycle. This process was repeated for all 10 cycles. After the final cycle, the *Naga Bhasma* was collected, weighed, and subjected to classical *Bhasma Pareeksha*.

Table 5: Details of *Naga Marana.*

SL No	Ingredients	Quantity	*Naga Bhasma* Quantity obtained
1.	*Jaritha Naga*	213gm	169gm Loss of 44gm
2.	*Shodita Gandhaka*	213gm	
3.	*Nimbu rasa*	QS	

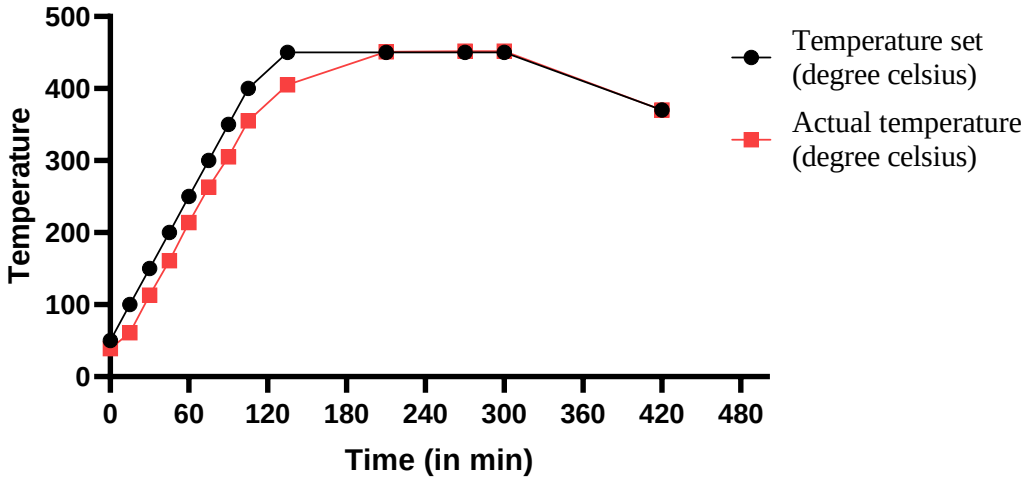

Figure 1: Graphical representation of Temperature pattern for *Naga Bhasma.*

RESULTS AND DISCUSSION

1. Role of *Churnodaka* in *Shodhana* of *Naga*

Churnodaka (lime water – Ca $(OH)_2$) is a strong alkaline medium. Repeated heating and quenching of molten *Naga* in this medium gradually render the metal brittle and causes oxidation of the lead surface. The lead oxide (PbO) formed reacts with hydroxide ions to produce lead hydroxide and basic lead carbonate on the metal surface. These surface compounds are progressively removed with each quenching cycle, thereby eliminating impurities and contaminants from the metal. A gradual increase in melting time was observed with successive *Dalana* cycles, possibly due to remnants of *Churnodaka* adhering to the metal surface and the absorption of the liquid medium during quenching.

2. *Process of Jarana and importance of use of Manashila*

Jarana is a unique intermediate process which involves gradual assimilation of *Shodita Manashila* into molten *Naga* enabling it to absorb into its matrix. From modern chemical perspective, formation of lead- arsenic sulphide complex within metal lattice partially disrupts the metallic bond of lead creating more pores and reducing the cohesive strength of the metal. The increase in weight represents the complete absorption of *Shodhita Manashila* into *Naga*. The structural disruption caused by *Jarana* is critical as it lowers the melting point, enabling more efficient and complete conversion to *Bhasma* during subsequent *Marana* procedure.

3. Role of *Shodita Gandhaka* in *Marana*

When *Shodhita Gandhaka* is mixed homogeneously with *Jarita Naga* and subjected to heat, a direct chemical reaction occurs between elemental sulphur and lead to form lead sulphide, a stable compound. Given the molecular weights of lead (207.2 g/mol) and sulphur (32.06 g/mol), a mass ratio of 1:1 provides a considerable molar excess of sulphur, ensuring that all available lead sites are sulphurised. This excess also compensates for the partial volatilization of sulphur at elevated temperatures during repeated *Puta* cycles.

4. Role of *Nimbu Swarasa* as *Bhavana Dravya*

The *Nimbu Swarasa* contains citric acid, ascorbic acid, malic acid, flavonoids and phenolic compounds. The primary role of citric acid is binding. Citric acid forms soluble lead-citrate complexes during *Bhavana*, effectively chelating lead ions that are released from the metallic surface during the process. The two important effects of Nimbu Swarasa : first, it reduces the size of lead particles; second, it distributes the lead more uniformly within the *Gandhaka* matrix ensuring contact between lead and sulphur which is essential for complete sulphurisation during calcination. Ascorbic acid, a potent reducing agent, protects *Gandhaka* from premature oxidation during *Bhavana*. The acidic environment created by *Nimbu Swarasa* also inhibits agglomeration of fine metallic lead particles, maintaining them in a finely dispersed state throughout the *Bhavana* process.

5. Temperature profile employed during *Puta*

The temperature profile employed in the present study, gradual increase to 450°C, maintained for one hour, followed by passive cooling replicates the temperature characteristics of classical *Puta*. The temperature of 450°C was selected for the first 8 cycles as it is the minimum temperature required to initiate and sustain the

lead-sulphur reaction while simultaneously being below the sublimation point of sulphur (444.6°C at atmospheric pressure), minimizing sulphur loss due to volatilization. The final 2 cycles at 500°C serve as a completion step designed to drive any residual unreacted lead or lead oxide to full conversion and the fine particles of PbS into a more cohesive Bhasma structure with enhanced stability.

6. Classical *Bhasma Pareeksha*

The colour of final product of *Naga Bhasma* was uniformly black resembling that of *Kajjali*. This indicates the complete conversion of metallic lead and its intermediate oxide forms into lead sulphide (PbS) compound which is the primary determinant of both the colour and the pharmaceutical safety of the Bhasma. The absence of *Nischandratva* (metallic lustre) confirms that no unreacted metallic lead remained in the final product. The *Bhasma* has passed *Varitaratva* (floating on water) indicates that the particle size has been reduced to a level where the surface tension of water is sufficient to support the Bhasma particles, *Rekhapurnatva* (filling skin ridges), *Slakshnatva* (smoothness) similarly indicate fine, uniform particles without aggregation and *Unnama Bhasma Preeksha.*

FIGURES

Figure 2: Preparation of *Sudha Jala*.

Figure 3: *Sudha Jala*.

Figure 4: Preparation of *Naga Shodhana.*

Figure 5: Liquification of *Naga* in *Darvi Yantra.*

Figure 6: *Ashudha Naga* poured into *Sudha Jala.*

Figure 7: *Shodita Naga.*

Figure 8: *Shodita Naga* and *Shodita Manashila*.

Figure 9: *Naga Jarana.*

Figure 10: Ingredients of *Naga Marana*.

Figure 11: Bhavana with Shodita Gandhaka and Nimbu Swarasa.

Figure 11: Preparation of *Chakrika*.

Figure 13: *Sharava* kept in Muffle furnace.

Figure 12: *Naga Chakrika* in powdered form arranged in *Sharava*.

Figure 14: *Naga Bhasma*.

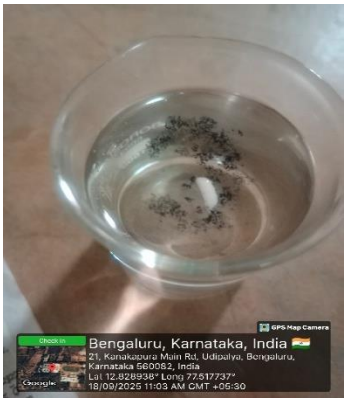

Figure 15: Varitara Pareeksha.

Figure 16: ***Rekhapurnatva Pareeksha.***

CONCLUSION

The present study demonstrates that the pharmaceutical transformation of *Naga* to *Naga* Bhasma through the classical protocol of *Shodhana* in *Churnodaka*, *Jarana* with *Shodhita Manashila*, and *Marana* with *Shodhita Gandhaka* and *Nimbu Swarasa*. The weight changes observed at each stage — 511 g to 535 g (*Shodhana*), 535 g to 625 g (*Jarana*) — and the organoleptic, physical, and classical quality characteristics of the final *Bhasma* are consistent with complete pharmaceutical transformation of toxic metallic lead into a fine, stable, jet-black lead sulphide-based Bhasma. *Gandhaka* provides the chemical mechanism of detoxification through sulphide formation, while *Nimbu Swarasa* serves as the indispensable processing medium enabling complete particle size reduction, uniform distribution, and enhanced reactivity. The controlled muffle furnace *Puta* protocol at 450°C (8 cycles) and 500°C (2 cycles) ensures reproducibility. The prepared *Naga Bhasma* satisfied all classical *Bhasma Pareeksha* parameters, affirming the quality and completeness of the transformation. These findings contribute to the evidence-based standardization of *Naga Bhasma* and affirm the critical pharmaceutical roles of *Gandhaka* and *Nimbu Swarasa* in classical *Rasa Shastra* processing.

REFERENCES

1. Angadi R, commentator. Rasatarangini of Sarma Sadananda with transcendence descriptive English commentary, chapter 11, verse 216-218, Varanasi: Chaukhamba Surbharati Prakashan, 2020; 187.
2. Angadi R, commentator. Rasatarangini of Sarma Sadananda with transcendence descriptive English commentary, chapter 19, verse9-10, Varanasi: Chaukhamba Surbharati Prakashan, 2020; 303-304.
3. Angadi R, commentator. Rasatarangini of Sarma Sadananda with transcendence descriptive English commentary, chapter 11, verse 114, Varanasi: Chaukhamba Surbharati Prakashan, 2020; 175.
4. Angadi R, commentator. Rasatarangini of Sarma Sadananda with transcendence descriptive English commentary, chapter 19, verse 19-20, Varanasi: Chaukhamba Surbharati Prakashan, 2020; 305.
5. Angadi R, commentator. Rasatarangini of Sarma Sadananda with transcendence descriptive English commentary, chapter 8, verse 13-17, Varanasi: Chaukhamba Surbharati Prakashan, 2020; 121-122.
6. Angadi R, commentator. Rasatarangini of Sarma Sadananda with transcendence descriptive English commentary, chapter 19, verse 21-23, Varanasi: Chaukhamba Surbharati Prakashan, 2020; 305.