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ADVERSE EFFECTS OF METALLIC RASA DRAVYAS WITH THEIR ANTIDOTES ACCORDING TO RASA JALA NIDHI – A NARRATIVE REVIEW

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ABSTRACT

Background: *Rasa Shastra*, a specialized branch of *Ayurveda*, extensively employs metals and minerals for therapeutic purposes. Despite their clinical efficacy, improper processing, dosage errors, or prolonged use of metallic *Rasa Dravyas* may lead to Adverse Drug Reactions (ADR). The *Rasa JalaNidhi*, an authoritative 20th-century treatise authored by *Bhudev Mukherjee*, provides a systematic documentation of these toxic manifestations alongside their specific *Pratyoushadha* (antidotes). **Aim:** To critically analyze the adverse effects of improperly prepared metallic medicines and the corresponding management protocols as described by B. *Mukherjee* in *Rasa JalaNidhi*. **Materials and Methods:** A critical literature review was conducted to investigate the toxic manifestations and management protocols associated with metallic *Rasa Dravyas*. The study focuses exclusively on a thematic analysis of the classical text *Rasa JalaNidhi* to synthesize and evaluate its established clinical guidelines**. Results:** The study identifies that the majority of metallic toxicities arise from incomplete Shodhana. *Bhudev Mukherjee* meticulously details symptoms ranging from gastrointestinal distress to systemic organ failure, prescribing specific herbal decoctions, dairy products, and minerals as immediate antidotes to neutralize these bio-accumulative effects. **Conclusion:** The documentation of adverse reactions and their

antidotes in *Rasa JalaNidhi* highlights the well-established safety framework in *Rasa Shastra*. Understanding these classical guidelines is essential for the rational, safe, and effective clinical application of metallic formulations. Further scientific validation may strengthen the global acceptability of *Rasa Aushadhis*.

KEYWORDS: *Antidote, Rasa JalaNidhi*, Metallic toxicity, Adverse drug reactions, *Pratyoushadha.*

INTRODUCTION

Rasa Shastra, a specialized branch of *Ayurveda*, encompasses the study of *Rasa Dravyas*—minerals and metals—focusing on their transition from raw substances to biocompatible medicines, aimed at achieving both *Deha-siddhi* (attaining bodily perfection/health) and *Loha-siddhi* (alchemical transmutation). Central to this discipline is the systematic pharmaceutical processing of these substances through rigorous procedures such as *Shodhana* (purification), *Marana* (incineration), *Jarana*(digestion), and *Amrtikarana* (a final, post-incineration refinement process). These processes are designed to transform potentially toxic substances into potent, bioavailable medicines suitable for clinical use. Historically, *Acharyas* recognized that improperly processed *Rasa Dravyas* could induce adverse effects; consequently, they established strict guidelines regarding processing, dosage, *Anupana* (adjuvants), and duration of therapy, alongside specific *Pratyausadha* (antidotes) to manage potential toxicity. This early framework of drug safety underscores the rational and cautious approach inherent to the tradition of *Rasa Shastra*.

Within this field, *Rasa Jala Nidhi* stands as a pivotal 20th-century treatise. Authored by *Bhudev Mukherjee* and published by Avani Prakashan, Ahemdabad in 1984, this work is widely regarded as one of the most systematic and comprehensive compilations in the science of Hindu Chemistry. Often referred to as the "Ocean of Indian Chemistry and Alchemy," the text serves as a significant repository of knowledge, synthesizing *Sanskrit* verses transmitted through oral traditions and citations from ancient alchemical texts. Although originally intended as a ten-volume work, *Mukherjee* completed the treatise in five volumes, methodologically arranging the matter with the guidance of his ascetic preceptor. Modeled on the tradition of classical texts like *Rasarnava*, *Rasa JalaNidhi* imparts a profound, structured insight into the preparation and management of mercurial and metallic substances.[1]

In the contemporary context of global safety concerns regarding metallic formulations, the integration of classical wisdom with modern safety standards is essential for evidence-based practice. While the broader *Rasa Shastra* tradition is well-documented in authoritative texts, *Rasa Jala Nidhi* offers a unique, granular perspective on the adverse manifestations and specific management protocols for these formulations. Therefore, the aim of this study is to conduct a critical review of the toxic manifestations associated with *Rasa Dravyas* and their corresponding antidotal measures, as exclusively described by *Bhudev Mukherjee* in *Rasa JalaNidhi*.

MATERIALS AND METHODOLOGY

The present study is a classical literary review based on *Rasa Jala Nidhi* as the primary source text to critically analyze the adverse effects of metallic *Rasa Dravya* and their corresponding antidotal measures. This study was designed as a narrative critical review focusing on the toxic manifestations arising from improper processing, excessive dosage, or inappropriate therapeutic use of metallic substances as described in *Rasa Shastra.*

The collected data comprised detailed descriptions of toxic manifestations (*Lakshana*), causative factors (*Hetu*), and prescribed antidotal measures, including *Prativisha* (antidote), *Shamana Dravya* (pacifying drugs), *Shodhana* (purification process)-related interventions, and supportive *Ahara–Vihara* (dietary& regimens) guidelines. Each identified adverse effect was documented systematically with reference to the concerned metal, clinical presentation, and recommended therapeutic approach.

RESULTS

Table 1: Showing the adverse effects caused by intake of impure or improperly processed metals with their *Pratyaushadha* (antidotes).

Sr. No.	Name of Metal	Causative Factors	Adverse Symptoms	Antidotes
A	**MAHARASA VARGA:**			
1.	*Abhraka* (Mica)	*Apakwa Bhasma* (not incinerated properly)	Pain in the cardiac region and flanks, oedema, tuberculosis, anaemia, and skin diseases.[2]	*Umaphala/ Amalaki*-(Indian Gooseberry)fruit, rubbed with water for 3 days.[3]
2.	*Makshika* (Copper Pyrite)	*Ashodhita* (impure) *Makshika*	Loss of appetite, loss of vigour, swelling of the belly	Decoction of *Kulattha* (Horse gram) or of the bark of Pomegranates.[5]

			with gas attended with constipation, eye diseases, leprosy, scrofula, carbuncle, and even death.[5]	
3.	*Shilajatu* (Black Bitumen)	Ashodhita (impure)	Inflammation, hysteric fits, giddiness, hemorrhage, loss of appetite, and constipation.[6]	Black Pepper with Ghruta for 7 days.[6]
4.	*Tuttha/ Sasyaka* (Copper Sulphate or Blue Vitriol)	Ashuddha (impure)	Severe Vomiting and Giddiness.[7]	a) Lime juice for three days. b) Drinking of water in which fried paddy is kept immersed for some time.[7]
B.	**UPARASA VARGA**			
5.	*Hartala* (Arsenic Trisulphide)	*Ashuddha* (impure)	Shortens life and abnormal excess of *Kapha*, *Vayu*,spermatorrhoea, gonorrhoea, inflammation, boils, and contraction of the limbs.[8]	a) *Jeera* (Cumin seeds) with sugar for 3 days. b) Juice of one of these three, viz., *Javasa* (*Alhagica melorum*), *Kushmanda* (Benincasa hispida*), and Rajahansa (Polianthes tuberose*).[9]
6.	*Manashila* (Arsenic disulphide)	*Ashuddha* (impure)	Stricture, stones, loss of appetite, and constipation.[10]	Cow's milk with honey, for three days.[11]
7.	*Kankushtha* (Rhubarb)	Ashuddha (impure)	-	Drink over and over again the decoction of the root of a *Barbura* (acacia) tree, mixed with an equal quantity of *Jeerak* (cumin seeds) and *Tankana* (Borax).[12]
8.	*Gandhaka* (Sulphur)	*Ashuddha* (impure)	Skin diseases, increase in body temperature, giddiness and diseases of *Pitta Dosa*. It adversely affects the body radiance, overall health and virility.[13]	Milk with cow's *ghee*.[13]
C.	**SADHARANA RASA VARGA**			
9.	*Hingula* (Mercury sulphide)	*Ashuddha* (impure)	Leprosy, impotency, fatigue, giddiness, and derangement of the brain.[14]	Like Mercury.[15]
D.	**DHATU VARGA**			

10.	*Swarna* (Gold)	*Ashuddha or Apakwa* (not roperly purified or incinerated)	Destroys health, semen, and strength, and gives rise to various diseases and even death.[16]	Not mentioned
11.	*Rajat* (Silver)	*Ashuddha or Apakwa* (not properly purified or incinerated)	Impairs longevity, semen, and strength, and gives rise to inflammation and constipation.[17]	Not mentioned
12.	*Tamra* (Copper)	*Ashuddha or Apakwa* (not properly purified or incinerated)	Impairs longevity, beauty, semen, and strength, also gives rise to vomiting, loss of consciousness, nausea, leprosy, and colic.[18]	a) *Dhanyaka Kwatha* (coriander decoction) + sugar- daily for three days. b) *Munivrihi*(*Sesbania grandiflora*)*Churna* + sugar, daily until the symptoms subside.[18]
13.	*Loha* (iron)	*Ashuddha* (Impure)	Impotency, leprosy, death, heart disease, colic, stone disease, hiccough, and even augmentation of many of the diseases the patient has already been suffering from.[19]	*Agastya(Sesbania grandiflora)SwarasaBhavitaVidanga* (*Embeliaribes*) along with *Agastya*(*Sesbania grandiflora*)*Swarasa* until the symptoms subsides.[20]
14.	*Yashada*(Zinc)	*Apakwa* (not incinerated properly)	Gonorrhoea, indigestion, flatulence, vomiting, and giddiness.[21]	*Bala*(*Sidacordifolia*) and *Haritaki*(*Terminalia chebula*) mixed with sugar for 3 days.[21]
15.	*Vanga* (Tin)	*Shodhana-Marana hina* (improperly purified and incinerated)	Spasm, shivering, vitiligo, tumor, skin disease, colic, dropsy, anemia, diabetes, fistula, impurities of the blood, phthisis, obstinate fever due to an excess of *Kapha*, stone disease, and tumour.[22]	*Meshashringi Churna or Kwatha* (*Gymnema sylvestre* powder or decoction) with sugar or sugar-candy for 3 days.[23]
16.	*Naga* (Lead)	*Shodhana-Marana hina*	Leprosy, tumor, loss of appetite, anemia, phthisis,	Incinerated gold with *Haritaki* (*Terminalia chebula*) (one fourth of a *Tola* in weight i.e., 3 gm), and

		(improperly purified and incinerated)	phlegm, troublesome impurities of the blood, fever, stone disease, colic, and fistula.[24]	sugar for three days.[25]
E.	**RATNA VARGA**			
17.	*Vajra* (Diamond)	*Ashuddha or Apakwa* (not properly purified or incinerated)	Leprosy, pain in the side ribs, anemia, inflammation, and heaviness of the limbs.[26]	Cow's milk with sugar-candy, honey, and clarified butter for 7 days.[27]

Table 2: Showing remedies to cure symptoms occur due to improper use of Mercury.[15]

Sr. No.	Symptoms	Remedy
1.	*Udgara* (gases out of alimentary canal)	Rice with curd and black fish cooked with *Jeera* (Cumin seeds)
2.	*Anil Kshobha* (excess of air)	Anointment with *Narayana Taila*
3.	*Arati* (restlessness of mind)	*Sita toya sinchana* (cold water over head)
4.	*Ati trushna* (excessive thirst)	Tender coconut water mixed with sugar and juice of *mudga* (Vigna radiate).
5.	Colic pain on lower part of navel, inactivity, drowsiness, lethargy, fever, shortness of eyesight, pain all over body, aversion to food, inflammation of whole body.	*Sauvarchala lavana* (black salt) with cow urine and the juice of *karkati* (Cucumis utilissimus) roots, or the juice of *matulunga* (Citrus medica) mixed with *saindhava lavana* (rock salt) and *shunthi* (dried Ginger) for 3 days.

Table 3: Showing the adverse effects caused by improper processing of formulations with their *pratyaushadha* (Antidote)[28]

Sr. No.	Formulation	Causative Factors	Adverse Symptoms	Antidotes
1.	*Rasa Karpura* (Mercurous Chloride or White Crystal of Mercury)	If not prepared in prescribed manner	Leprosy, gout, excess of phlegm	*Mahishi Shakruta nira* (watery portion of the stool of she- buffalo) or *dhanya* (Coriandrum sativum) mixed with sugar candy.
2.	*Rasa Sindura* (Red Sulphide of Mercury)	Prepared out of impure Mercury	As that of impure Mercury	Clarified butter with powdered *maricha* (Piper nigrum) for 7 days.

DISCUSSION

The present critical review elucidates the comprehensive and systematic approach adopted in *Rasa Jala Nidhi* toward the recognition and management of adverse effect associated with metallic *Rasa Dravyas* (metallic/mineral medicinal preparations). Contrary to the common

misconception that classical Ayurvedic pharmaceutics overlooked drug safety, the detailed documentation of toxic manifestations (*Doṣha-Lakṣaṇa*—signs and symptoms of *Dosha* imbalance) and their corresponding antidotes (*Pratyauṣadha*) clearly reflects an advanced and structured pharmacovigilance framework within *Rasa Shastra*.

A striking observation of this review is that adverse effects are predominantly attributed not to the inherent nature of metals but to improper pharmaceutical processing—specifically *Ashuddha* (unpurified) or *Amarita Dravya* (non-nectar-like/unprocessed substances)—inadequate *Maraṇa* (incineration), excessive dosage, prolonged administration, or inappropriate *Anupana* (vehicle or adjuvant). This aligns with the classical Ayurvedic principle that any substance, if improperly used, can act as a poison.[29] Metals such as *Abhraka* (Mica), *Tāmra*(Copper), *Naga* (Lead), *Vanga* (Tin), and *Lauha* (Iron) exhibit multi-system involvement when administered without proper purification and incineration, affecting *Agni* (digestive fire), *Rakta* (blood), *Sukra*(reproductive essence), and vital organs such as *Hṛdaya* (heart) and *Yakṛt* (liver).

The antidotal measures described in *Rasa JalaNidhi* demonstrate remarkable therapeutic logic, primarily relying on *Doṣa-Shamana* (pacification of bodily humors), *Viṣaghna*(antitoxic), *Dipana-Pachana* (digestive and metabolic stimulation), *Rasayana* (rejuvenating), and organ-protective properties. For instance, the use of *KulatthaKwatha* (Horse gram decoction) in *Makṣhika* (Copper pyrite) toxicity and *DhanyakaKwatha* (Coriander seed decoction) in *Tamra* (Copper) toxicity reflects a profound understanding of metabolic correction and hepato-protective (liver-protecting) action.

This rationale extends to other metallic agents as well. The antidotes prescribed for *Hartala* (Arsenic trisulphide) toxicity—such as *Jeera* (Cumin) with sugar or *Kuṣhmaṇḍa* (Ash gourd) juice—illustrate a targeted approach to managing metabolic acidity and pitta aggravation. Similarly, the use of *Bala* (*Sida cordifolia*) and *Haritaki* (*Terminalia chebula*) for *Yashada*(Zinc) toxicity, and the application of lime juice or water processed with *Laja* (fried paddy) for *Tuttha* (Copper sulphate) toxicity, highlight a nuanced method of mitigating irritant metallic properties and facilitating systemic detoxification. Furthermore, the reliance on milk, *ghee* (clarified butter), and ghee-based preparations for *Gandhaka* (Sulphur), *Manashila* (Arsenic disulphide), and *Vajra* (Diamond) toxicity indicates an explicit emphasis on counteracting *uṣṇa-tikṣṇa guṇas* (hot and sharp properties) and restoring tissue integrity. The text provides nuanced, condition-specific protocols for the most potent metallic agent in

Rasa Shastra, Mercury (*Parada*). As detailed in the findings, the remedies for mercury-induced toxicity are tailored to the specific systemic presentation. Symptoms such as *Udgara* (gases) are treated with a regimen of rice, curd, and black fish cooked with *Jeera* (cumin seeds) to stabilize digestion. For conditions like *Ati trushna* (excessive thirst), the text prescribes cooling agents like tender coconut water mixed with sugar and *mudga* (Vigna radiate). juice. For severe manifestations including colic pain, lethargy, and general body aches, the protocol involves the administration of *Sauvarchala lavana* (black salt) combined with cow urine, or *Matulunga* (citrus) juice with *Saindhava lavana* (rock salt) and *Shunthi* (dried ginger). Meanwhile, mental restlessness (*Arati*) is managed through the cooling, soothing practice of *Sita toya sinchana* (cold water application over the head).The management of complex formulations, such as *Rasa Karpura* (mercurous chloride) and *Rasa Sindura* (red sulphide of mercury), further highlights the precision of these safety protocols. If these substances cause adverse reactions due to improper preparation, the text provides specific countermeasures like the use of buffalo stool water (*Mahishi Shakruta nira*) or *Dhanyaka* (coriander) with sugar candy for *Rasa Karpura*, and *ghee* with powdered *Maricha* (black pepper) for *Rasa Sindura*. These interventions underscore that even refined, potent therapeutic preparations require rigorous, vigilant clinical monitoring.

Another important aspect is the repeated emphasis on short-duration antidotal therapy, commonly for three to seven days, suggesting a focus on acute toxicity management rather than long-term suppression of symptoms. This acute response strategy closely parallels modern toxicological interventions aimed at rapid detoxification and organ protection. Furthermore, because many of the antidotes are dietary or easily accessible herbal agents, the text reflects a pragmatic and patient-centric approach.

When viewed in the context of contemporary safety concerns regarding herbo-mineral formulations, the findings of this review reaffirm that classical *Rasa Shastra* did not promote the indiscriminate use of metals. Instead, the texts emphasized stringent pharmaceutical discipline, vigilant clinical observation, and ready therapeutic countermeasures. The absence of antidotes for certain metals underscores the classical emphasis on prevention through *Shodhana* (purification) and *Marana* (incineration), establishing *Rasa Jala Nidhi* as a vital reference on rational therapeutics and drug safety in *Ayurveda*.

Though, *Rasa Jala Nidhi* offers a vital, systematic framework for Ayurvedic toxicology, yet integrating this metallic therapeutics into modern global healthcare necessitates rigorous

scientific validation. To successfully transition these traditional antidotal protocols into evidence-based safety standards, a structured research agenda is essential—encompassing pre-clinical evaluations, molecular studies on detoxification mechanisms (such as chelation or antioxidant modulation), and comparative clinical trials. By bridging this evidentiary gap, the field of *Rasa Shastra* can evolve from a classical textual tradition into a standardized, scientifically substantiated component of contemporary integrative medicine.

CONCLUSION

This critical review of *Rasa Jala Nidhi* reveals that the text provides a surprisingly comprehensive and practical safety framework for using metallic medicines in *Ayurveda.* A common modern concern is the safety of metallic formulations, but our analysis of this classic text highlights a vital distinction, the adverse effects are almost always tied to improper processing—such as skipping essential *Shodhana* (purification) or *Marana* (incineration) steps—rather than the metals being inherently toxic when prepared correctly.

Ultimately, this study confirms that classical *Rasa Shastra* was not a practice of indiscriminate medicine; it was built on a foundation of careful pharmaceutical discipline, vigilant clinical observation, and accessible, nature-based countermeasures. The ancient authors understood that even the most potent substances require strict handling and ready-to-use antidotes.

While these classical guidelines are a treasure trove of wisdom, they don't have to exist in the past. To truly bring these ancient safety protocols into today's world, we need to bridge the gap with modern science. By combining this traditional knowledge with current research—such as molecular studies on detoxification and modern clinical trials—we can turn these historical practices into evidence-based safety standards. This path forward allows *Rasa Shastra* to evolve into a more trusted, standardized, and integral part of modern integrative healthcare.

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