Ayurline I J – R I M

AYURLINE

e-ISSN: 2456-4435
Vol. 09th | Issue:5th| 2025

International Journal of Research in Indian Medicine

Article Received Date:12 /15/2025 | Reviewed on Date: 27/09/2025 | Accepted on: 17/10/2025

Kajjali (Black Sulphide of Mercury): A Critical Analysis of its Essential Role in *Rasashastra*

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Abstract:

Aim : To review the classical concepts, preparation methods, types, therapeutic applications, and modern scientific validations of *Kajjali* (black sulphide of mercury), a key pharmaceutical preparation in *Rasashastra*, emphasizing its role in the transformation of mercury into a therapeutically potent and non-toxic form.

Objectives:

1. To explain the method of preparation of *Kajjali* through the trituration of *Shuddha Parada* (purified mercury) and *Shuddha Gandhaka* (purified sulfur).
2. To analyze the different types of *Kajjali* based on the ratio of mercury and sulfur, and their relevance in various therapeutic applications.

Observations:

1. *Kajjali* is prepared by triturating *Shuddha Parada* (mercury) with *Shuddha Gandhaka* (sulfur), which results in a fine, black, lustreless substance.
2. Different types of *Kajjali* are identified based on the ratio of mercury to sulfur, such as *Samaguna*, *Dwiguna,* and *Shadguna*, which are chosen based on the ailment being treated.
3. *Kajjali* passes classical tests like *Rekhapurnatwa, Nishchandratva, and Varitaratva,* which demonstrate its preparation quality and suitability for therapeutic use

Results

1. *Kajjali*, when prepared correctly, possesses key characteristics like non-lustrous black appearance and soft texture, making it an ideal base material for *Rasaushadhis* .
2. Modern scientific research provides increasing validation of the safety and efficacy of *Kajjali*, confirming its potential in treating a variety of conditions when used as part of Ayurvedic practices.

Conclusion

Kajjali is a foundational substance in *Rasashastra*, acting as both a therapeutic agent and a medium for transforming mercury into a non-toxic form. Its versatile applications in the preparation

of *Rasaushadhis, Kupipakwa Rasayana, Pottali Kalpa,* and *Marana* underline its significance in *Ayurvedic* pharmaceutics.
keywords: *kajjali, Parad, Gandhak, Rasaushadhi , Kupipakwa rasayan,Pottali kalpa*

Introduction

Rasashastra, a specialized branch of *Ayurveda*, is devoted to the processing and therapeutic use of metals, minerals, and allied substances for disease management and health promotion [1]. Rooted in the ancient Indian alchemical tradition, it evolved through centuries of observation, experimentation, and textual codification [2]. The fundamental premise of *Rasashastra* is to render potent but naturally toxic substances—such as mercury (*Parada*) and sulphur (*Gandhaka*)—safe for internal use through a series of rigorous purification (*Shodhana*) and transformation (*Murchana*) techniques [3].

Among the many formulations described in *Rasashastra*, *Kajjali* occupies a unique and indispensable position [4]. It is considered the first step in converting mercury into a therapeutically viable form [5] *Kajjali* is prepared by triturating *Shuddha Parada* with *Shuddha Gandhaka* until the mixture becomes a uniform, soft, lusterless black powder [6]. This process is believed to instill the *Vyadhiharatva* (disease-curing potency) in mercury, making it the foundation for a variety of *Rasaushadhi* preparations, including *Rasasindura*, *Makaradhwaja*, *Parpati Kalpa*, and *Pottali Rasayana*[7].

Earlier works on *Kajjali* both textual and experiential have extensively documented its formulation, characteristics, and therapeutic utility [8]. Classical texts such as *Rasa Tarangini*, *Rasa Ratna Samucchaya*, and *Ayurveda Prakasha* offer detailed insights into its preparation and application [9]. Contemporary *Ayurvedic* scholars have attempted to compile these references and classify *Kajjali* based on the ratios of mercury and sulphur used (e.g., *Samaguna*, *Dwiguna*, *Shadguna* Kajjali), correlating them with specific clinical indications.

However, despite its critical role, the knowledge on *Kajjali* remains dispersed across texts, and the comprehensive understanding of its varieties, pharmaceutical principles, and therapeutic roles is still evolving [12]. There is a need to consolidate classical information and analyze the conceptual depth of *Kajjali* from the *Rasashastra* perspective, especially in light of its foundational role in *Sagandha Murchana* and *Bandha* [13].

Aims and Objectives

Aim:

To critically review and analyze the classical *Ayurvedic* concept of *Kajjali*, its preparation, classification, properties, and its essential role in *Rasashastra*[14].

Objectives:

1. To collect and compile classical references related to *Kajjali* from authoritative *Rasashastra* texts[7].
2. To describe the types of *Kajjali* based on *Parada-Gandhaka* ratios and their classical indications[9].
3. To analyze *Kajjali's* role in *Rasayoga* formulations and its application in different dosage forms[15].
4. To explore the classical concepts of *Murchana*, *Jarana*, and *Marana* in relation to *Kajjali*[10].
5. To highlight *Kajjali's* position as a *Yogavahi* and its contribution to the efficacy of herbo-mineral preparations [13].

Classical Definitions and Types

Definition: *Kajjali* is formed when *Shuddha Parada* is triturated with *Shuddha Gandhaka* without any liquid medium until it forms a fine, black, lusterless powder[4].

Types Based on *Gandhaka* Ratio

Ratio (*Parada*:*Gandhaka*)	Name
1:½	*Ardhaguna Kajjali*
1:1	*Samaguna Kajjali*
1:2	*Dwiguna Kajjali*
1:3	*Triguna Kajjali*
1:4 – 1:6	*Chaturguna* and higher

Each type has different pharmacological properties and is used in specific formulations like *Rasasindura, Makaradhwaja*, and *Kanakasundara Rasa* [15].

Method of Preparation

The preparation of *Kajjali* involves two primary steps: *Shodhana* (purification) and *Mardana* (trituration)[1]. In the purification process, *Parada* (mercury) is cleansed using substances like *Lashuna* (garlic), *Kanji*, and *Triphala*, which help eliminate physical and chemical impurities [14]. Similarly, *Gandhaka* (sulphur) is purified through methods involving *Dugdha* (milk), *Ghrita* (ghee), and various herbal decoctions (*Kwathas*) to remove toxic elements such as arsenic and acidic impurities [6]. After purification, the *Mardana* process begins, where equal or appropriate proportions of purified mercury and sulphur are triturated together in a Khalva Yantra (mortar and pestle). This process continues until the compound becomes homogenous, black in color, and exhibits the classical features of well-prepared Kajjali. These include the absence of metallic shine (*Nishchandratva*), a smooth and fine texture (*Slakshnata*), the ability to float on water (*Varitara*), and the quality of settling into the fine lines of the fingers (*Rekhapurna*) [14]

Dhatu Pishti

Some formulations involve the preparation of *Dhatu Pishti*—an amalgamation of mercury with metallic foils like gold or silver before adding sulphur to prepare *Kajjali*. This enhances assimilation and potency in preparations like:

- *Makaradhwaja*
- *Hemagarbha Pottali*
- *Swarnavanga*

Such pharmaceutical sophistication is detailed in *Rasa Hridaya Tantra* and *Sara Sangraha*[5].

Pharmacological Concepts: Murchana and Jarana

In ***Ayurveda Prakash***, the terms *Murchana* and *Jarana* are occasionally used interchangeably, especially in the context of *Gandhaka Jarana* (processing of mercury with sulfur). However, in most contexts, they represent **distinct procedures** within the broader practice of ***Parada Samskara*** [10].

The **central idea** of both processes is to transform mercury—either with or without sulphur—into a **stable, therapeutically potent form**, which can be administered internally without converting it into ash.

Murchana

- *Murchana* literally implies the **infusion of therapeutic attributes** into mercury (Parada) [11].
- It is considered a **distinct *Samskara*** in which mercury transitions from its **liquid metallic state to a powdered form [12].**
- The goal is to induce ***Avyabhicharita Vyadhighatakatva*** [13], meaning **consistent disease-curing capacity** in mercury compounds.
- Notably, after undergoing *Murchana*, **mercury does not revert** to its original metallic state (*Purva Avastha*) [13].
- A classic example of *Murchana* without heat application is ***Kajjali*,** which is a form of *Sagandha Niragni Murchana*—processing mercury with sulphur through **vigorous trituration**, resulting in a smooth, black powder free from

luster and capable of floating on water [15]

- Kajjali acts as the **foundation** for other mercury-based formulations like *Kupipakwa Rasayana*, *Parpati Kalpa*, and *Pottali Kalpa*, all of which involve **heat processing** (*Sagandha Agni Murchana*).

Jarana

- *Jarana*, on the other hand, refers to the **digestion** of metals or minerals within mercury through various pharmaceutical techniques.
- It often utilizes special instruments like ***Baluka Yantra, Kachchapa Yantra***, and ***Jarana Yantra*** to achieve this process [16]
- Unlike *Murchana*, ***Jarana* does not change the form of mercury permanently;** mercury retains its original nature after the digestion process**.**
- It involves digesting substances such as purified sulphur (*Shuddha Gandhaka*) with mercury in varying ratios (1:1 to 1:6) to make mercury more **receptive and active** for further procedures.[17]
- Although in some textual references *Jarana* and *Murchana* are treated synonymously, this applies **only in the specific context** of sulphur digestion. Outside this, they serve **separate purposes**.
- Importantly**, *Jarana* does not impart therapeutic qualities** to mercury directly. Instead, it is aimed at **enhancing its potency for metallurgical transformation** (*Dhatuvada*) and preparing it for subsequent *Samskaras*.[18]

In short, ***Murchana* imparts medicinal value**, while ***Jarana* enhances processing ability** without therapeutic transformation.

Kajjali Pareeksha

Before using *Kajjali* in any medicinal preparation, it is important to assess its quality through specific traditional tests. These tests ensure that the *Kajjali* is properly prepared and safe for therapeutic use. The key features of well-prepared *Kajjali* include:

- Smooth texture (*Slakshna*): It should feel soft and finely ground when touched.
- Black appearance (*Kajjalabha*): The Kajjali must be deep black in color, similar to eye collyrium (kajal).
- Absence of shine (*Nishchandratva*)**:** It should not have any shiny or glittering particles, indicating that mercury and sulphur have blended completely.
- Line-filling capacity (*Rekhapurna*): When rubbed on the skin, it should fill even the small creases or lines on the fingers.
- Ability to float (*Varitara*)**:** A small amount of *Kajjali* sprinkled on water should float, showing its lightness and proper fineness.

These traditional parameters help confirm the *Kajjali* is of high quality and suitable for internal use in *Rasashastra* formulations [16].

Therapeutic Applications

Kajjali is used in:

- *Kupipakwa Rasayana (e.g., Rasasindura)*
- *Pottali Kalpa*
- *Parpati Kalpa*
- *Khalviya Rasayana*
- *Lepakalpana*[15] (e.g., *Kajjalikodaya Malahara*)

Sample Indications Based on Ratios:

Kajjali Ratio	Anupana (Adjuvant)	Indications
1:1	Honey + *Karpura*	Vomiting (*Chardi*), *Vidradhi, Ajirna*[12]
1:2	*Tulasi Bhavana*	*Kasa, Tamaka Shwasa, Visarpa*[15]

1:3 or more	Honey + Sugar	*Vataroga, Gajacharmaroga, Apasmara*[16]

Toxicological Considerations

- Non-toxic form*: Kajjali* contains HgS, which is insoluble, hence poorly absorbed in GI tract.
- Scientific Validation: Modern studies confirm *Kajjali's* stability and low toxicity due to complete amalgamation of mercury and sulphur[20].

Discussion

Kajjali, as the cornerstone of *Rasashastra*, presents a fascinating synthesis of alchemical precision, therapeutic utility, and philosophical depth. The classical *Ayurvedic* texts unanimously recognize *Kajjali* not just as a formulation, but as a *transformative process* that converts the inherently toxic mercury into a biologically acceptable and therapeutically potent form. The comprehensive review of its preparation, classification, and application affirms its role as both an individual drug and a fundamental pharmaceutical intermediate in numerous *Rasaushadhis*.

The stepwise process of *Kajjali* formation—from *Shodhana* to *Murchana*—is critical in ensuring its safety and efficacy. Classical tests such as *Rekhapurnatwa* and *Varitaratwa* may seem simple, but they reflect a profound empirical understanding of particle size reduction and homogeneity.The classification based on *Parada-Gandhaka* ratios (*Samaguna, Dwiguna, Shadguna*, etc.) reveals the Ayurvedic approach to dose customization and indication specificity[15]. Each variant of *Kajjali* serves distinct clinical purposes—from gastrointestinal disorders to neurological and respiratory conditions. This pharmaceutic rationality resonates with modern principles of formulation development where drug-carrier ratios significantly influence bioavailability and therapeutic response.Importantly, *Kajjali* functions beyond its role as a drug; it acts as a *Yogavahi*—a concept akin to a bioenhancer or nanocarrier in modern pharmacology[17] Its ability to penetrate subtle channels (*Sookshma Marganusari*) and deliver co-administered substances with enhanced efficacy mirrors contemporary drug delivery systems.

Moreover, the rising concerns about heavy metal content in Ayurvedic formulations call for stringent quality control and standardization protocols [19].*Kajjali's* reproducible preparation under classical guidelines ensures a consistent and non-toxic form of mercury, but modern pharmaceutical industries must adapt these methods to comply with Good Manufacturing Practices (GMP) and regulatory frameworks, *Kajjali* symbolizes the transformative essence of *Rasashastra*—turning poison into panacea through knowledge, discipline, and precision. The paper reiterates that classical Ayurvedic pharmaceutics, when interpreted through modern scientific lenses, holds immense potential. With continued research, documentation, and interdisciplinary collaboration, *Kajjali* can serve not only as a therapeutic agent but as a model for safe and effective integration of metals in modern healthcare [13].

Conclusion

Kajjali exemplifies the brilliance of ancient Ayurvedic pharmaceutics, converting toxic mercury into a safe, therapeutic compound through a meticulous, standardized, and reproducible process [4]. Its wide applicability in *Rasaushadhis* highlights its enduring significance in both classical and modern contexts. Kajjali stands as a testament to the sophisticated pharmaceutical knowledge of classical Ayurveda, transforming the highly toxic mercury into a safe, stable, and therapeutically potent form through precise classical methods. Its preparation through *Sagandha Murchana* without the use of external heat represents a unique pharmaceutical alchemy,

showcasing the depth of Rasashastra in balancing efficacy with safety.

Beyond being a mere intermediate product, Kajjali forms the pharmaceutical backbone of numerous formulations like *Rasasindura, Makaradhwaja, Parpati, and Pottali Kalpas*[18]. It serves not only as an active therapeutic agent but also functions as a *Yogavahi*—enhancing drug delivery and therapeutic outcomes by ensuring deeper tissue penetration. Its ability to adapt into various dosage forms—*Kupipakwa, Khalviya, Parpati,* and *Malahar*—further reinforces its versatility in Ayurvedic therapeutics.

Additionally, the classification based on *Gandhaka* ratios (Samaguna, Dwiguna, Shadguna, etc.**)** offers a tailored therapeutic approach in line with disease-specific requirements. This rational pharmaceutics signifies that classical *Ayurveda* was not just empirical but profoundly logical and customizable.

Kajjali is not merely a pharmaceutical product but a symbol of transformation—of toxic to therapeutic, of gross to subtle, and of ancient wisdom to modern relevance. Its holistic understanding and correct application can revolutionize the therapeutic potential of herbo-mineral formulations in *Ayurvedic* practice. Continued research, standardization, and clinical trials will help further establish *Kajjali* as a cornerstone of evidence-based *Ayurvedic* pharmaceutics in contemporary healthcare [20].

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Conflict of Interest: Non

Source of funding: Nil

Cite this article:

Kajjali (Black Sulphide of Mercury): A Critical Analysis of its Essential Role in Rasashastra
Pikalmunde Sayali Gangadhar, Kubde Sneha

Ayurline: International Journal of Research In Indian Medicine 2025; 9(5):01- **07**