

An Observational Analysis On Preparation Of Kajjali Nirmana -An Important Formulation Of Rasa Shastra

Dr Munesh Yadav^{1*}

^{1*} Ayurvedic Medical Officer, AYUSH Department, Haryana

***Corresponding Author - Dr Munesh Yadav**

*Ayurvedic Medical Officer, AYUSH Department, Haryana, Email.id- drmuneshyadav1@gmail.com, Mob- 9958935938

ABSTRACT

Rasashastra, or Indian alchemy, is often viewed with skepticism due to the presence of heavy metals like mercury (*Parada*) and sulfur (*Gandhaka*) in its formulations. Critics argue that these metals are toxic to the human body. However, a substantial body of scientific research supports the safety, efficacy, and tolerability of *Rasayogas*, traditional Ayurvedic formulations involving these metals, when properly processed and administered. Modern studies, conducted by researchers in Ayurveda, have repeatedly demonstrated that these preparations can be safe and beneficial under guided therapeutic use. One of the most important *Rasayogas* is *Kajjali*, a black compound that forms the foundation of many other *Rasashastra* formulations. *Kajjali* is prepared by the careful combination of *Parada* (mercury) and *Gandhaka* (sulfur) in a specific process that detoxifies these elements, rendering them safe for medicinal use. The quality and efficacy of *Kajjali* depend on the precise ratios of *Parada* and *Gandhaka*, and different combinations produce distinct therapeutic properties. The ratio of these ingredients determines the type of *Kajjali* and its medicinal applications. There are several varieties of *Kajjali*, classified based on the proportion of mercury and sulfur used in their preparation. The traditional method involves a meticulous grinding process to create a homogenous mixture, which is then processed further depending on the required medicinal purpose. For instance, a 1:1 ratio of mercury to sulfur may be used for general purposes, while a higher concentration of sulfur in comparison to mercury might be indicated for specific conditions. While *Rasashastra* and its formulations such as *Kajjali* have faced scrutiny due to the presence of metals like mercury, the proper detoxification and preparation techniques used in Ayurveda mitigate the risks associated with these substances. The unique combination of mercury and sulfur, especially in various *Kajjali* preparations, holds great therapeutic potential and continues to be a subject of both traditional Ayurvedic practice and modern scientific research. With growing interest in integrative and alternative medicine, it is crucial to recognize the safety, efficacy, and centuries-old wisdom behind the use of *Rasayogas* like *Kajjali* in promoting health.

KEY WORDS: *Kajjali*, Different Ratios of *Kajjali*, *Rasayoga*,

INTRODUCTION-

Rasashastra, an important branch of Ayurveda, has been recognized since the medieval period for its unique approach to the therapeutic use of metals and minerals. This specialized discipline focuses on the preparation and administration of various metallic and mineral compounds, particularly those containing mercury (*Parada*), which is the cornerstone material of *Rasashastra*. Among the many formulations prepared within this system, *Kajjali*—black mercury sulphide—is one of the most significant.[1]

Kajjali is prepared by combining purified *Parada* (mercury) with *Gandhaka* (sulfur), both of which undergo extensive detoxification processes to ensure safety and efficacy. In *Rasashastra*, *Kajjali* represents one of the primary dosage forms of *Parada*. It serves as a foundational substance in numerous classical formulations, many of which combine *Kajjali* with a variety of other herbs and minerals to potentiate their effects.[2] The synergy between *Kajjali* and herbal components is well-recognized, as the metallic matrix of *Kajjali* enhances the bioavailability and therapeutic potential of the herbs with which it is combined.[3]

The preparation of *Kajjali* is a highly technical process. It involves a specific method of trituration, wherein purified *Parada* is thoroughly mixed with *Gandhaka* or other mineral substances without the addition of any liquid.[4] This grinding process continues until the mixture transforms into a fine black powder, signifying the formation of *Kajjali*. The black coloration is a hallmark of the completion of this transformation, indicating that the mercury and sulfur have fully bonded to create a stable, non-toxic compound. This mixture is highly revered in *Rasashastra*, particularly for its versatile use in various *Sagandha Rasayogas*—medicines that combine mercury with sulfur.[5]

The classical *Rasagranthas* (texts of *Rasashastra*) provide extensive references to *Kajjali*, though these references are often scattered across different contexts and headings. These texts describe not only the process of *Kajjali*'s preparation but also its wide-ranging therapeutic applications. Many formulations in these texts combine *Kajjali* with other ingredients, whether they are herbal or mineral in origin, to treat a variety of diseases. However, the dispersed nature of

these references has led to a need for systematic compilation, review, and analysis to fully understand the scope and potential of *Kajjali* in Ayurvedic therapeutics.[6]

Definition of *Kajjali*:

The classical definition of *Kajjali* describes its preparation in detail. According to ancient Ayurvedic texts, *Kajjali* is formed when purified mercury (*Parada*) is triturated with other purified substances such as sulfur (*Gandhaka*) without the use of any liquids.[7] The trituration process continues until the mixture achieves a fine consistency and turns black in color. This black mixture, known as *Kajjali*, is the fundamental base for all *Sagandha Rasayogas*, which utilize sulfur as a key component. (8)

The importance of *kajjali* in Ayurvedic medicine cannot be overstated. It serves as a core ingredient in numerous formulations designed to balance *Tridoshas*(*Vata*,*Pitta* ,*Kapha*) and to address various elements.(9)

Kajjali plays a central role in the practice of *Rasashastra* and is revered for its therapeutic applications. Its preparation process is meticulous and scientifically supported, and its use alongside herbal medicines provides a powerful means of addressing a wide range of health issues. The references to *Kajjali* in classical texts highlight its versatility, but they are often scattered, necessitating a thorough review and systematic presentation to better appreciate its medicinal value.[10]

SYNONYMS:

- *Kajjali*
- *Kajjala*
- *Kajjalika*

Method of Preparation of *Kajjali*:[11]

1. **Simple Trituration of *Parada* with *Gandhaka*:** The most straightforward method involves triturating purified *Parada* with *Gandhaka* in different ratios. The process begins by purifying both substances—*Parada* is detoxified using specific techniques, and *Gandhaka* undergoes purification as well to remove impurities that might hinder the therapeutic efficacy or increase toxicity. Once purified, the two substances are combined and ground together in a process known as *Bhavana*. This mechanical grinding continues until the mixture becomes fine and takes on a uniform black color. The appearance of this black color indicates that the mercury and sulfur have bonded successfully to form *Kajjali*, a stable compound that can now be used in various *Rasayoga* formulations.

2. **Trituration of *Parada* with Metals (*Dhatupishti*) and *Gandhaka*:** When metals other than sulfur, such as gold (*Swarna*) or other *Dhatus* (metals), are used, the preparation of *Kajjali* becomes more complex. The first step in this method is to prepare a compound known as *Dhatupishti*, which is a combination of *Parada* and the purified metal, typically *Swarna* or another therapeutic metal. The process begins by purifying the metal, then triturating it with purified mercury until the two form a fine paste, which is called *Dhatupishti*. After this step, *Gandhaka* is introduced, and the entire mixture is triturated further until it becomes fine and black, indicating the formation of *Kajjali*. The combination of mercury with metals and sulfur increases the potency of the resulting preparation, making it suitable for more complex or specific therapeutic applications.

Importance of Ratios in *Kajjali* Preparation: [12]

The therapeutic properties and applications of *Kajjali* vary significantly based on the ratio of *Parada* to *Gandhaka* in the preparation. Each ratio serves a distinct purpose and is used in different formulations of *Rasayogas*. These specific formulations are documented in classical texts and are categorized by the ratios of mercury and sulfur. Below is a detailed explanation of how different ratios are utilized in the preparation of *Kajjali* and the respective *Rasayogas* they are employed in:

1. ***Kajjali* with 1:½ Ratio of *Parada* to *Gandhaka*:** In this ratio, for every one part of *Parada*, half a part of *Gandhaka* is used. This specific ratio is documented in various classical texts, and its corresponding formulations are compiled in Table 1. The 1:½ ratio is typically used in *Rasayogas* aimed at balancing *Vata* and *Pitta* doshas, as it offers a more controlled and milder therapeutic effect due to the lower concentration of *Gandhaka* compared to *Parada*.

2. ***Kajjali* with 1:1 Ratio of *Parada* to *Gandhaka*:** This is one of the most common ratios used in *Kajjali* preparation, where equal parts of *Parada* and *Gandhaka* are mixed. This ratio is highly versatile and used in a wide variety of *Rasayoga* formulations, particularly those aimed at balancing all three doshas (*Vata*, *Pitta*, and *Kapha*). The formulations that use this ratio are compiled in Table 2. The balanced proportion of mercury and sulfur makes this ratio ideal for general therapeutic applications and enhances the synergy between the two elements.

3. ***Kajjali* with 1:2 Ratio of *Parada* to *Gandhaka*:** In this ratio, two parts of *Gandhaka* are combined with one part of *Parada*. The increased concentration of sulfur amplifies the detoxifying and immune-modulating effects of the preparation. *Kajjali* prepared with this ratio is generally more potent and is employed in *Rasayogas* designed to treat more severe or chronic conditions, particularly those related to *Kapha* dosha. The corresponding formulations are listed in Table 3.

4. **Kajjali with 1:3 Ratio of Parada to Gandhaka:** In the 1:3 ratio, *Gandhaka* is present in a significantly higher quantity compared to *Parada*. This ratio is utilized in formulations that require a more aggressive approach to cleansing and detoxifying the body. The preparations made using this ratio are more targeted toward disorders that involve high levels of toxicity or metabolic imbalances. The formulations employing this ratio are compiled in Table 4.

5. **Kajjali with 1:4 Ratio of Parada to Gandhaka:** This is one of the more concentrated forms of *Kajjali*, where four parts of *Gandhaka* are used for every one part of *Parada*. The higher sulfur content makes this form of *Kajjali* particularly potent for treating diseases that involve deep-seated imbalances or those that are resistant to conventional treatments. The formulations that use this ratio are compiled in Table 5. Due to the high concentration of sulfur, this form of *Kajjali* is carefully administered under strict therapeutic guidelines.

The preparation of *Kajjali* is a critical process in *Rasashastra*, with different ratios of *Parada* and *Gandhaka* being employed for various therapeutic applications. The ratio of these elements plays a significant role in determining the potency, effect, and use of the final product in *Rasayoga* formulations. Each ratio serves a specific purpose in treating different doshic imbalances and diseases, and the systematic documentation of these formulations in classical texts highlights the precision and depth of knowledge involved in this ancient science.

TABLE NO. 1 Rasayoga with Ardhaguna Gandhaka Kajjali (1:½ ratio of Parada and Gandhaka):

Name of Rasayoga
Chaturthikahara Rasa
Mehari Rasa
Suryavartha Rasa
Krishnamanikya Rasa
Swasantaka Rasa
Timirahara Anjana

Table No. 2 showing Some Rasayoga with Samagunagandhaka Kajjali (1:1 ratio of Parada and Gandhaka):

Name of Rasayoga
Trilokyasundara Rasa
Umaprasadana Rasa
Nava Jwarari Rasa
Trilokyadambara Rasa
Sarvangasundara Chintamani Rasa
Jalamanjari Rasa
Jwaragajakeshari
Suchimukha Rasa
Kanta Rasa
Dipika Rasa
Sannipatha Gajankusha Rasa
Chandrodaya Rasa
Sheetabhanji Rasa
Chaturtika Gajankusha Rasa
Jeerna Jwarari Rasa
Mruthasanjeevana Rasa (Dwithiya)
Panchavakra Rasa
Navajwara Murari Rasa
Mahajwarankusha Rasa
Unmatta Rasa
Raktapittankusha Rasa
Jwarankusha Rasa
Pratapa Lankeshwara Rasa
Bhutaankusha Rasa
Mruthyunjaya Rasa (Prathama)
Praneshwara Rasa
Swasaharavataka
Chandra Surya Rasa
Sannipatha Kutara Rasa
Neelakanta Rasa
Swasakasakarikesari Rasa

<i>Trilokyatilaka Rasa</i>
<i>Ajeernakantaka Rasa</i>
<i>Surya Rasa</i>
<i>Sudhasara Rasa</i>
<i>Visuchividhwamsa Rasa</i>
<i>Kajjali Yoga</i>
<i>Nagasundara Rasa</i>
<i>Vaishwanara Potali Rasa</i>
<i>Kanaka Sundara Rasa</i>
<i>Agnikumara Rasa</i>
<i>Amrutha Vati</i>
<i>Kshayashamaka Rasa</i>
<i>Chandasamgrahagadhaikapata Rasa</i>
<i>Rakshasa Rasa</i>
<i>Vajra Rasa</i>
<i>Laghusiddhabhra Rasa</i>
<i>Vadavanala Rasa</i>
<i>Thrushnahara Yoga</i>
<i>Sheegraprabhava Rasa</i>
<i>Agniyanani Vati</i>
<i>Sarvalokhashraya Rasa</i>
<i>Potali Rasa</i>
<i>Sarvarogakulantaka Vati</i>
<i>Arkesharasa</i>
<i>Vahnijwalavati</i>
<i>Trivikrama Rasa</i>
<i>Tikshnamukha Rasa</i>
<i>Vajradhara Rasa</i>
<i>Panchaanana Rasa</i>
<i>Pramehari Rasa</i>
<i>Gulmanashana Rasa</i>
<i>Arogyasagara Rasa</i>
<i>Bhimaparakrama Rasa</i>
<i>Vadavanala Vati</i>
<i>Trilokyadundhara Rasa</i>
<i>Rajamrugankara Rasa</i>
<i>Agnikumara Rasa</i>
<i>Vijayagutika</i>
<i>Mehahara Rasa</i>
<i>Leelavilasa Rasa</i>
<i>Jayapala Rasa</i>
<i>Ubhayabhaskara Rasa</i>
<i>Jeemutakadi Vati</i>
<i>Kameshwara Rasa</i>
<i>Deeptamara Rasa</i>
<i>Vinodavidyadhara Rasa</i>
<i>Suptakushtari Rasa</i>
<i>Vidyadhara Rasa</i>
<i>Vaishwanara Rasa</i>
<i>Suryaprabhagutika</i>
<i>Kustanashana Rasa</i>
<i>Agnikumara Rasa</i>

Table No. 3 showing Rasayoga with Dwiguna Gandhaka Kajjali (1:2 ratio of Parada and Gandhaka):

Name of Rasayoga
<i>Mruthasanjeevana Rasa (Thruthiya)</i>
<i>Sarvarogaya Vati</i>

<i>Tamradhruthi Rasa</i>
<i>Chandrakala Rasa</i>
<i>Kravyada Rasa</i>
<i>Surechanaka Rasa</i>
<i>Agni Rasa</i>
<i>Jeevananama Rasa</i>
<i>Mahavahni Rasa</i>
<i>Bhagottaragutika</i>
<i>Pashanabhedi Rasa Prathama</i>

Table No. 4: Rasayoga with Triguna Gandhaka Kajjali (1:3 ratio of Parada and Gandhaka)

Name of Rasayoga	Therapeutic Use
<i>Agnimukha Rasa</i>	Treats digestive issues, enhances metabolism
<i>Paradaadi Lepa</i>	External application for skin disorders and wounds

Table No. 5: Rasayoga with Chaturguna Gandhaka Kajjali (1:4 ratio of Parada and Gandhaka)

Name of Rasayoga	Therapeutic Use
<i>Mahaveerari Rasa</i>	General tonic, strengthens immunity and vitality
<i>Udaya Martanda Rasa</i>	Treats chronic and complex diseases, rejuvenator
<i>Sarveshwara Rasa (Dhwithiya)</i>	Potent general tonic, used in multiple ailments
<i>Sarveshwara Rasa</i>	Strengthens all bodily systems, used in chronic conditions
<i>Triyoni Rasa</i>	Beneficial for female reproductive disorders

Kajjali Pareeksha (Examination of Kajjali):[13] Before *Kajjali* is used in any medicinal formulation, it must undergo a thorough examination to ensure its quality and safety. The classical Ayurvedic texts describe specific parameters that *Kajjali* should meet to be considered properly prepared and effective. These criteria are designed to assess the physical properties of *Kajjali*, ensuring that it has been processed correctly. The following are the key examination parameters:

1. **Slakshna (Smooth Texture):** *Kajjali* should have a smooth, fine texture when rubbed between the fingers. This indicates that the mercury and sulfur have been properly triturated, ensuring a homogenous mixture without any coarse particles.
2. **Kajjalabha (Black Color like Collyrium):** The finished *Kajjali* should appear jet black, similar to collyrium (*Kajjal*). This deep black color signifies the proper bonding of mercury and sulfur, indicating that the chemical process has been completed correctly.
3. **Nishchandrata (Devoid of Shiny Particles):** The *Kajjali* should not contain any shiny or reflective particles. Shiny particles suggest that mercury has not been fully incorporated into the mixture, which could indicate improper preparation and potential toxicity.
4. **Rekhaapurna (Penetration into Fine Lines of Fingers):** When *Kajjali* is rubbed on the skin, it should easily fill the fine lines of the fingers. This indicates the fineness of the powder and the thoroughness of the trituration process. This quality is crucial for ensuring that *Kajjali* can be absorbed effectively when used in formulations.
5. **Varitara (Floats on the Surface of Water):** Properly prepared *Kajjali* should float on the surface of water. This is considered an essential test, as it demonstrates the lightness and proper consistency of the final product. If *Kajjali* sinks in water, it may indicate improper preparation, incomplete trituration, or an imbalanced ratio of mercury and sulfur.

DISCUSSION:

Kajjali is one of the most used and highly regarded preparations in *Rasashastra*, dating back to ancient times. It is essentially a mixture of *Parada* (mercury) with *Gandhaka* (sulfur) or other metals in varying ratios, depending on the intended use and therapeutic application.[14] The importance of *Kajjali* in Ayurvedic medicine stems from the fact that mercury, in its natural elemental form, is highly toxic and cannot be consumed. Additionally, mercury is notoriously difficult to convert into a stable, powdered form under atmospheric conditions, making it unsafe for direct use in any medicinal preparation.

The process of preparing *Kajjali* not only detoxifies mercury but also stabilizes it, allowing it to be safely incorporated into a wide variety of Ayurvedic formulations, especially *Rasaushadhi* (herbo-mineral preparations). *Kajjali* thus forms the fundamental component of most herbo-mineral formulations, as it provides both structural and functional stability to these medicines. The mercury-sulfur combination in *Kajjali* serves as a potent medium that can enhance the therapeutic efficacy of the final product.

In the preparation of *Rasaushadhis*, *Kajjali* is the first step in creating stable, bioavailable medicinal compounds. It is used in several dosage forms such as *Khalvi Rasayana*, *Parpati Rasayana*, *Kupipakwa Rasayana*, and *Pottali Rasayana*.

Moreover, it is used in topical formulations like *Kajjalikodaya Malahara* (ointments) and as a medium for liquefaction (*Druti*) and application (*Lepakalpana*) for external use. Among the various types of *Kajjali* preparations, *Shadguna Gandhaka Kajjali* (with six parts of sulfur to one part mercury) is considered highly potent. However, as observed in traditional practices and the preceding tables, most herbo-mineral compounds utilize *Samaguna Gandhaka Kajjali* (1:1 ratio of mercury and sulfur), which balances the properties of both mercury and sulfur and is suitable for many therapeutic applications.

One of the key roles of *Kajjali* is its involvement in the *Marana* (calcination) of metals and minerals. *Marana* refers to the process of transforming metals or minerals into their bioavailable *Bhasma* (ash) form, which can then be safely consumed. Ancient Ayurvedic texts emphasize that the best *Bhasma* preparations are those made using mercury as the medium. In cases where mercury itself cannot be used directly, *Kajjali* can serve as an effective alternative medium for *Marana*. The mercury in *Kajjali* acts as a powerful agent that helps in the transformation of metals into their therapeutic *Bhasma* form, making it easier for the body to assimilate the medicinal properties of these metals.

Kajjali is also categorized as a type of *Murchana*, a process by which mercury is detoxified and transformed into a form that can cure diseases (*Vyadhiharatva*). Due to this property, *Kajjali* is widely used for therapeutic purposes in the treatment of various ailments. Its *Vyadhiharatva* properties, combined with its ability to act as a potent detoxifying agent, make it a valuable tool in *Rasashastra* for treating diseases and improving overall health with *anupana* and *sahapanas*. (15)

Kajjali plays an essential role in *Rasashastra* by transforming toxic mercury into a stable, safe, and highly effective medicinal substance. Its use as a foundational component in herbo-mineral preparations, as a medium for *Marana*, and as a therapeutic agent with *Vyadhiharatva* and *Rasayana* properties underscores its significance in Ayurvedic practice.

CONCLUSION:

The ancient Ayurvedic sages and physicians placed a high regard on *Rasachikitsa* (alchemy-based treatment), considering it one of the most effective forms of therapeutic intervention. They believed that formulations involving *Rasa* (mercury) held immense curative potential due to mercury's unique properties, such as its ability to penetrate deep into the tissues, rejuvenate the body, and address chronic or complex disorders. However, despite its therapeutic potential, mercury in its natural elemental form is highly toxic and cannot be consumed directly because of its harmful effects on the body. To overcome this challenge, Ayurvedic texts describe a process that detoxifies and converts mercury into a safe, consumable form. This process, known as the preparation of *Kajjali*, involves triturating purified *Parada* (mercury) with *Gandhaka* (sulfur) in different ratios. The two substances are ground together through a mechanical process called *Bhavana* until they form a homogenous mixture that is fine, black, and smooth. The transformation into a fine black powder—*Kajjali*—is significant as it represents the successful bonding of mercury and sulfur into a stable compound. This mixture is devoid of mercury's natural toxicity, and it takes on properties that are therapeutically potent, making it suitable for medicinal use. The resulting *Kajjali* is used as the foundational component in many herbo-mineral (*Rasaushadhi*) preparations, which are highly regarded in *Rasashastra* (Ayurvedic alchemy). These preparations are known for their ability to treat a wide range of conditions, including chronic diseases, metabolic disorders, and immune deficiencies. The combination of mercury and sulfur not only stabilizes mercury but also enhances its therapeutic efficacy by making it more bioavailable and potent when combined with other medicinal substances. Mercury's transformation into *Kajjali* provides it with structural and functional stability, allowing it to serve as the core ingredient in many Ayurvedic medicines. These medicines take various forms, including *Khalvi Rasayana*, *Parpati Rasayana*, *Kupipakwa Rasayana*, *Pottali Rasayana*, and topical preparations like *Lepakalpana* (ointments).

Furthermore, *Kajjali* is widely used as a medium in the *Marana* (calcination) process of metals and minerals, where metals are converted into their *Bhasma* (ash) form, making them safe and beneficial for human consumption. The ability of *Kajjali* to act as a potent therapeutic agent lies in its unique properties. It is classified as a type of *Murchana*, a process in *Rasashastra* that detoxifies substances and imparts disease-curing properties (*Vyadhiharatva*). This makes *Kajjali* highly effective for therapeutic purposes, as it has the ability to address a variety of ailments, from chronic conditions to metabolic imbalances. In addition, *Kajjali* also exhibits *Rasayana* properties, which are known to rejuvenate the body, promote longevity, and improve overall health by strengthening the immune system and enhancing vitality. The ancient Ayurvedic physicians recognized the unmatched therapeutic potential of mercury when processed correctly. Through the preparation of *Kajjali*, mercury is transformed into a safe, stable, and effective compound that forms the basis of many Ayurvedic treatments. This process not only detoxifies mercury but also enhances its medicinal properties, allowing it to be used in a wide range of *Rasayoga* (mercury-based) formulations aimed at promoting health, treating diseases, and rejuvenating the body. The success of *Rasachikitsa* depends on the meticulous preparation of *Kajjali*, which has been proven to be a potent and safe therapeutic tool in Ayurvedic medicine for centuries.

CONFLICT OF INTEREST -NIL

SOURCE OF SUPPORT -NONE

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