

EVALUATION OF ANTIBACTERIAL PROPERTIES OF AYURVEDIC KANSYA
BHASMA PREPARED FROM DIFFERENT METHODS

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ABSTRACT

This study evaluates the antibacterial efficacy of *Kansya Bhasma*, an Ayurvedic metallic preparation, against various bacterial strains. The study involves two distinct methods of *Kansya Bhasma* preparation one with *Hingula* (HgS) and another with *Gandhak* (Sulfur). The antibacterial activity was tested against *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pyogenes* and *Salmonella typhi*. Antibacterial testing revealed that both samples exhibited good activity against Gram-positive bacteria, particularly *Streptococcus aureus* and *Streptococcus pyogenes*. The results suggested that the preparation method significantly influences the antibacterial effectiveness. *Kansya Bhasma* showed significant antibacterial effects due to sulfur content and *Sagandha Parad* in two distinct formulations. Study confirmed appreciable antibacterial efficacy of *Kansya Bhasma* and this activity significantly affected by the chief contents of formulations. *Kansya Bhasma*, when prepared with *Gandhak* exhibited potent antibacterial effects. The unique chemical properties of *Gandhak* may enhance the efficacy of the *Bhasma* compared to *Hingula*. This could be due to the synergistic effects of the constituents, as well as differences in their interactions with microbial cell structures.

KEYWORDS: Ayurveda, *Kansya Bhasma*, *Hingula*, *Gandhak*, Antibacterial.

INTRODUCTION

Ayurvedic medicines often incorporate metallic preparations known as *Bhasmas*, which are believed to have therapeutic properties. *Kansya Bhasma* is one such preparation, traditionally used in treating various ailments, including infections. This preparation typically involves processing metals and minerals through techniques like *Marana*, often incorporating ingredients

such as *Manashila*, *Gandhaka* and *Hingula*. It is recognized for its antibacterial properties, especially against Gram-positive bacteria like *Streptococcus aureus* and *Streptococcus pyogenes*, with the sulfur content potentially enhancing its efficacy. The major therapeutic applications of *Kansya Bhasma* are depicted in **Table 1**.^[1-5]

Table 1: Therapeutic Applications of *Kansya Bhasma*.

Therapeutic Application	Description
Antibacterial Activity	Effective against Gram-positive bacteria, reducing infections.
Wound Healing	Promotes faster recovery of wounds and prevents infection.
Anti-inflammatory	Helps reduce inflammation in various conditions.
Enhancement of Immunity	Supports the immune system to fight against infections.
Detoxification	Aids in the removal of toxins from the body.
Digestive Disorders	Alleviates symptoms of digestive issues, enhancing digestion.
Skin Conditions	Used in treatments for skin ailments due to its healing properties.
Respiratory Disorders	May help to alleviate symptoms of respiratory infections.

Given the rise in antibiotic resistance, exploring alternative therapies, such as Ayurvedic formulations, is critical. Considering this aspect present study focuses on evaluating the antibacterial properties of *Kansya Bhasma*, prepared by different methods, against several pathogenic bacterial strains.^[5-7]

MATERIALS AND METHODS

Two types of *Kansya Bhasma* were prepared using two different methods; the first sample involved *Marana* with *Manashila* and *Gandhaka*, while the second sample used *Hingula*. The evaluation of antibacterial activity was

performed using culture media obtained from Himedion Pvt. Limited.

EVALUATION OF ANTIBACTERIAL ACTIVITY

Bacteria	Media Used
<i>Staphylococcus aureus</i>	Blood Agar, Nutrient Agar, Muller Hinton Agar
<i>Escherichia coli</i>	MacConkey Agar, Muller Hinton Agar
<i>Streptococcus pyogenes</i>	Blood Agar
<i>Salmonella typhi</i>	MacConkey Agar, Muller Hinton Agar

Preparation of *Bhasma* Solutions

The samples were diluted to concentrations of 100 mg/ml, 50 mg/ml, and 25 mg/ml using distilled water.

Antibacterial Testing

The antibacterial activity was evaluated using a broth dilution method and agar plating to count bacterial colonies. Each sample was incubated for 24 hours at 37°C, followed by colony counting to assess bacterial growth inhibition. The antibacterial activity was assessed using glucose broth as a liquid medium and Muller Hinton agar as a solid medium through the bacterial broth dilution method.^[4-6]

1. Bacterial Broth Solution

A bacterial broth solution was prepared with a concentration equivalent to a 0.5 McFarland standard.

2. Preparation of Drug Concentrations

Desired concentrations of the *Kansya Bhasma* solution were directly added to 1 ml of glucose broth bacterial solution.

3. Incubation

The mixtures were incubated for 24 hours at 37°C.

4. Plating and Colony Count

- After incubation, the bacterial broth was plated according to standard procedures.
- Colony counts were performed following established protocols to determine the antibacterial efficacy of the *Kansya Bhasma*.

For the evaluation of antibacterial activity, a calibrated loop delivering 0.005 ml was used to inoculate the media. The inoculated plates were incubated for an additional 24 hours, after which colonies were counted.

The count was multiplied by 200 to obtain the number of colony-forming units (CFU) per ml of broth. Concentration up to 1000 CFU/ml was considered indicative of an inhibitory effect. This method allowed systematic assessment of the antibacterial efficacy of the tested substances.^[4-7]

RESULTS AND OBSERVATIONS

Two different sample of *Kansya Bhasma* were prepared as follows:

- ✓ **Sample 1:** *Kansya bhasma* made by *Marana* with *Manhsila* and *Gandhak*
- ✓ **Sample 2:** *Kansya bhasma* made by *Marana* with *Hingula*.

The study revealed varying levels of bacterial inhibition, depending on the preparation method of formulation and concentrations. Strains prevalent in the local population, selected based on their antibiotic susceptibility profiles, were plated and observed for antibacterial activity. In this study, a colony count of less than 50 was considered indicative of the effectiveness of the drug (*Kansya Bhasma*). Study confirmed antibacterial potential of *Kansya Bhasma* especially at higher concentrations.

Anti-bacterial Effects of Sample-1

Sample-1 showed complete inhibition of *Staphylococcus aureus* and *Streptococcus pyogenes* at concentration 100 mg/ml. While moderate inhibition was observed at higher concentration for *Escherichia coli*. Some inhibition at higher concentrations also observed against *Salmonella typhi*. The data summarizes in **Table 2** and **Figure 1** for each bacterial strain tested with different concentrations of *Kansya Bhasma* prepared by *Marana* with *Manhsila* and *Gandhak* (Sample 1).

Table 2: Anti-bacterial effects of different concentrations of Sample-1.

Bacterial Strain	Concentration (mg/ml)	Growth Observed	Inhibition (%)
<i>Staphylococcus aureus</i>	100	0	100
	50	2	50
	25	4	0
<i>Escherichia coli</i>	100	2	50
	50	3	25
	25	4	0
<i>Streptococcus pyogenes</i>	100	0	100
	50	2	50
	25	3	25
<i>Salmonella typhi</i>	100	1	75
	50	2	50
	25	4	0

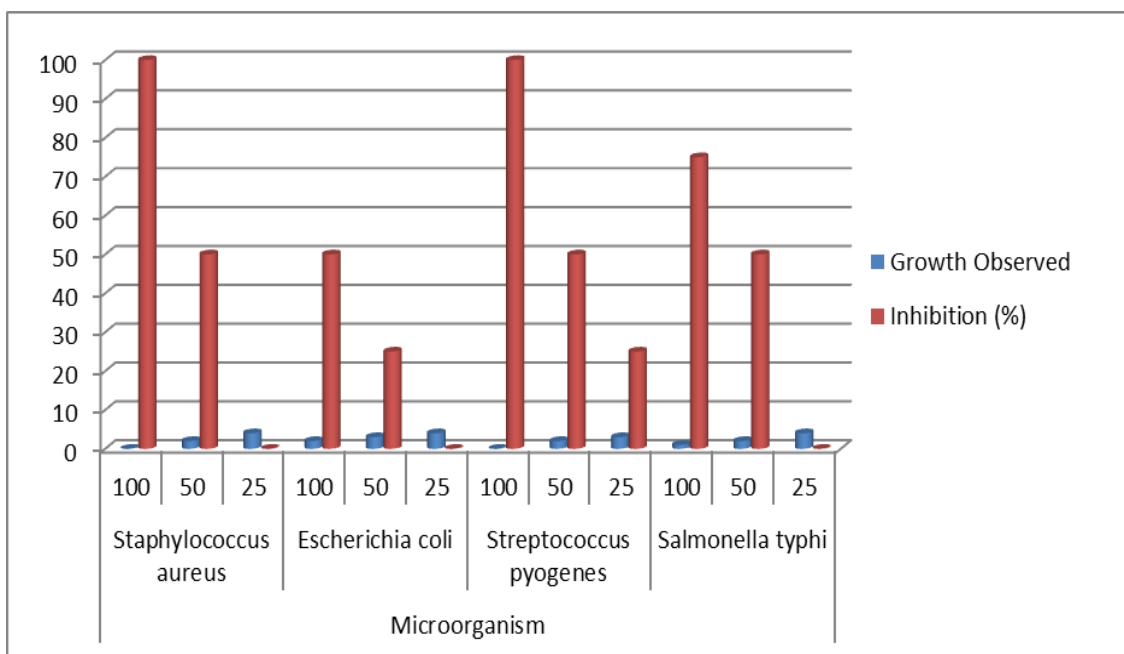


Figure 1: Antibacterial effects of various concentrations of formulation-I.

Anti-bacterial Effects of Sample-2

Sample 2 showed complete inhibition of *Staphylococcus aureus* and *Escherichia coli* at the highest concentration (100 mg/ml). Moderate inhibition was observed against *Streptococcus pyogenes*, while reduced effectiveness of

sample 2 was observed against *Salmonella typhi* at lower concentrations. The data summarizes in **Table 3** and **Figure 2** for each bacterial strain tested with different concentrations of *Kansya Bhasma* prepared by *Marana* with *Hingula* (Sample 2).

Table 3: Anti-bacterial effects of different concentrations of Sample-2.

Bacterial Strain	Concentration (mg/ml)	Growth Observed	Inhibition (%)
<i>Staphylococcus aureus</i>	100	2	50
	50	2	50
	25	3	25
<i>Escherichia coli</i>	100	0	100
	50	1	75
	25	4	0
<i>Streptococcus pyogenes</i>	100	1	75
	50	3	25
	25	3	25
<i>Salmonella typhi</i>	100	1	75
	50	2	50
	25	4	0

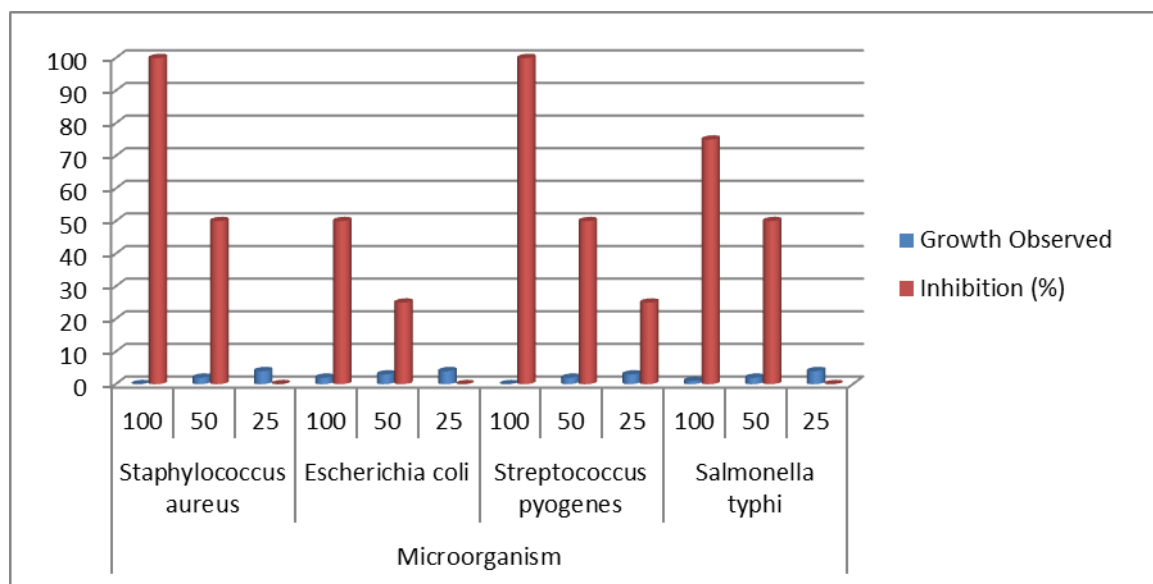


Figure 2: Antibacterial effects of various concentrations of formulation-II.

DISCUSSION

The antibacterial activity of *Kansya Bhasma* was evaluated against strains of *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pyogenes* and *Salmonella typhi*. The drug was used at concentrations of 100 mg/ml, 50 mg/ml, and 25 mg/ml. For *Staphylococcus aureus*, the first sample at a concentration of 100 mg/ml was effective on three strains, while the second sample was effective on two strains. In the case of *Escherichia coli*, the first sample at 100 mg/ml was effective on two strains, and the second sample showed effectiveness on four strains. For *Streptococcus pyogenes*, at 100 mg/ml, the first sample was effective on four strains, whereas the second sample was effective on three strains. Finally, for *Salmonella typhi*, a concentration of 100 mg/ml was effective on three strains in both the samples.

The study highlights that the method of *Kansya Bhasma* preparation significantly influences its antibacterial activity. The formulation using *Gandhak* (Sulfur) demonstrated stronger and broader-spectrum antibacterial properties compared to the one using *Hingula* (HgS). This can be attributed to the chemical composition, as *Gandhak* is known to possess antibacterial and antifungal properties. The results are promising, especially for *Staphylococcus aureus* and *Escherichia coli*, where both formulations showed high efficacy against these two microbial strains.^[7-10]

CONCLUSION

Kansya Bhasma was prepared using two different methods. In the first method, *Marana* was conducted using *Manahsila* and *Gandhak*, while in the second method; *Marana* was performed with *Hingula*. The study aimed to evaluate the antibacterial effectiveness of these two samples. *Kansya Bhasma* prepared using *Gandhak* exhibited superior antibacterial properties compared to the preparation using *Hingula*. This study underscores

the potential of Ayurvedic preparations in modern antibacterial treatments, especially in light of antibiotic resistance. Further research is necessary to refine these formulations and evaluate their clinical efficacy. However, the relatively lower effectiveness against *Salmonella typhi* suggests that *Kansya Bhasma* might not be effective against all bacterial strains, indicating the need for more focused studies on dosage and formulation improvement.

REFERENCES

1. Rasaratna Samuccaya. (2006). Rasaratna Samuccaya of Vagbhata. Chaukhamba Sanskrit Bhawan, Varanasi. (Chapter 7, Shloka 10-15: Kansya Shodhana and Marana).
2. Rasa Tarangini. (2015). Rasa Tarangini of Sadananda Sharma. Edited by Kashinath Shastri. Motilal Banarsidass, Delhi. (Taranga 12, Shloka 23-30: Kansya Bhasma Preparation).
3. Ayurvedic Pharmacopoeia of India (API). (2010). Part I, Volume VI, Government of India, Ministry of AYUSH. (Standard Operating Procedures for Kansya Bhasma, pp. 120-123).
4. Singh, S., & Chaudhary, A. Pharmaceutical and Antibacterial Study of Kansya Bhasma. Journal of Ayurveda and Integrative Medicine, 2011; 2(4): 154-159. doi:10.4103/0975-9476.90772.
5. Rastogi, S., & Pandey, M. M. Antimicrobial activity of Ayurvedic metallic preparations: A scientific approach. Indian Journal of Traditional Knowledge, 2010; 9(1): 67-71.
6. Rai, M., Yadav, A., Gade, A. Antibacterial activity of metal oxide nanoparticles. Biotechnology Advances, 2009; 27(1): 76-83. doi:10.1016/j.biotechadv.2008.09.002.
7. Rasa Tarangini of Shree Sadananda Sharma translated by Pandit Kashinath Shastri, Motilal Banarsidas Publications, Delhi, India; Edition Taranga 22, Shaloka, 2009; 21-34: 573-576.

8. Sharngadhara Samhita by Pandit Sarngadharacharya, Dipika Hindi commentary by Dr. Brahmananda Tripathi, Chaukhamba Subharti Prakashana, Varanasi, India; Reprint Chapter 11, Shaloka, 2011; 27.
9. Rasa Prakasha Sudhakara by Acharya Yashodhara, translated by Dr. Siddhinandan Mishra, Chaukhamba Orientalia, Varanasi, India; Reprint Chapter 4, Shaloka, 2009; 112-115: 86-87.
10. Ayurveda Prakasha of Acharya Shree Madhava, Sanskrit and Hindi commentaries by Shree Gulraj Sharma Mishra and Pandit Shiva Sharma, Chaukhamba Bharati Academy, Varanasi, India; Reprint Chapter 4, Shaloka., 2007; 75-80, 423-425.