


Research Article
BACTERICIDAL ACTIVITY OF RASA SINDOORA
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ABSTRACT

Infectious diseases are the health disorders that are caused by infection causing organisms which use human body for surviving, reproducing and colonizing. These organisms are known as pathogens. Gradually increasing microbial resistance has made it more complicated. Therefore, everyone wants to explore remedies from natural source. *Rasa sindoora* is a *Kupipakva Rasayana* which is very popular and is widely used in therapeutics. In vitro evaluation of its bactericidal activity against the strains of some bacteria those are responsible for disease was carried out in microbiology laboratory, SBLD Ayurved Vishwabharti. Agar well diffusion method and disc diffusion methods was followed to assess the bactericidal activity like bacteria *Salmonella Sp.*, *Staphylococcus aureus subsp. aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli* and the zone of inhibition were calculated. *Staphylococcus aureus subsp. aureus* and *Escherichia coli* show maximum zone of inhibition result. All the bacteria were found susceptible against samples of *Rasa sindoora* with different concentration. When *Rasa sindoora* concentration will be increasing the gradually microbial concentration will be decreasing. After calculation of minimum inhibitory concentration *E.Coli* Show Maximum susceptibility against *Rasa sindoora* on concentration of 0.50 mg/ml and *Pseudomonas aeruginosa* show minimum inhibition against *Rasa sindoora* on concentration of 0.50 mg/ml.

KEYWORDS: Bactericidal Activity, *Rasa sindoora*, *Kupipakva Rasayana*.

INTRODUCTION

Rasa shastra is an important branch of learning in the field of Ayurveda and deals with those medicinal preparations which are originally concerned with minerals. *Rasa shastra* literally means “the science of mercury” but generally it refers to the science of making minerals, metals absorbable and assumable for the body so they can be used as medicines. *Rasa sindoora* is one among the *Sagandha*, *Kanthastha*, *Bahirdhooma* type of *Kupi Pakwa rasayana*. *Kupipakva kalpana* is one of the most important *Kalpa* of *Rasashastra*. The first most typical *Kupipakva rasayana* mentioned in the text ‘*Rasaprakash sudhakara*’ (13th century) was – ‘*Udaya Bhaskara Rasa*’. ‘*Udaya Bhaskara rasa*’ is nothing but another name of *Rasasindoora*. In 15th century, Acharya Anantadeva Suri mentions “*Rasaparthiva Rasa*” in his Text ‘*Rasachintamani*’. In *Rasakaumudi* (16th century) and *Ayurveda Prakash* (17th century) mentioned “*Sindura Rasa*” or “*Sindura sadrisa rasa*” for *Rasasindura*⁽¹⁾. Later the same product was named as *Rasa sindoora*. In 20th AD author of *Rasa tarangini* has given detailed description about *Kupipakva rasayana* like *Rasa-sindoora*, the word

“*Rasa*” denotes to mercury, further *Sindoora* is said to be created from lead “*Nagodbhavam*” otherwise called lead oxide, as well as *Rakta/nagarenu/aranam*, *Sandhyaragam* (colour of sun during sunset) & amp; The synonyms like ‘*Ganesh-bhushanam*’, *Mahila bhala bhooshana*, *Shringara bhooshana* are applied over the word *Sindoora* ⁽³⁾. It is also said “*Sindooram Rakta renurashcha*” which denotes *Sindoora* is red coloured powder ⁽⁷⁾.

Rasa sindoora is a compound formulation of mercury and sulphur prepared by subjecting to specialized pharmaceutical process known as *Kupipaka* ⁽⁴⁾. Studies carried out on *Rasa sindoora* have emphasized on its pharmaceutical standardization, Mercury sulfide associated with several organic macro molecules and trace elements in different amounts ⁽¹⁰⁾.

Bactericidal, anything that destroys bacteria or suppresses their growth or their ability to reproduce. Heat, chemicals such as chlorine, and antibiotic drugs all have antibacterial properties. In this study four different we examined antibacterial

activity of *Rasa sindoora* against four different microbes in which:

<i>Staphylococcus aureus</i>	Gram Positive, Round Shaped Bacterium	frequently found in the upper respiratory tract and Skin	<ul style="list-style-type: none"> • Leading cause of bloodstream infections throughout much of the industrialized world. • Also responsible for all major bone and joint infections, food poisoning and Skin infections
<i>Salmonella sp</i>	Gram Negative, Rod shaped bacterium	Facultative intercellular	<ul style="list-style-type: none"> • Causes typhoid fever in human • Self-limiting gastrointestinal disease in human and animal depends upon their species
<i>Pseudomonas aeruginosa</i>	Gram Negative, Rod shaped bacterium	Respiratory track, Skin	<ul style="list-style-type: none"> • Infections of burn injuries, • Pneumonia, infections of the outer ear , • Frequent colonizer of medical devices (e.g., catheters)
<i>Escherichia coli</i>	Gram Negative, Rod shaped coliform bacterium	found in the lower intestine of warm blooded organism	<ul style="list-style-type: none"> • Diarrhoea

MATERIAL AND METHODS

Present study has been carried out to assess in-vitro bactericidal potential of *Rasa sindoora* against four selective microorganisms. An MTTC No 1162 *Salmonella Sp.*, MTTC no 87 *Staphylococcus aureus subsp.aureus*, MTTC 424 *Pseudomonas aeruginosa*, MTCC 40 *Escherichia coli* cultures were obtained from Microbial Type Culture Collection and Gene Bank, Chandigarh, India.

The cultures were maintained on solid agar plate media and stored at 4°C till further use. Well and disc diffusion methods were followed for the testing the bactericidal properties of different samples. Purified extracts were dissolved in Dimethyl Sulfoxide (DMSO) and stored at 4°C for the determination of ZOI, pure gram positive and gram negative strains were taken. The sets of five dilutions (0.10, 0.20, 0.30, and 0.50 mg/mL) of extracts was

prepared in double distilled water using nutrient agar tubes. The zones of growth inhibition around the disks were measured after 24 to 36 h of incubation at 37°C.

The sensitivity of the microorganism species to formulation were determined by measuring the sizes of inhibitory zones (including the diameter of well) on the agar surface. MIC of drug was determined by broth dilution method. This classic method yields a quantitative result for the amount of antimicrobial agents that is needed to inhibit growth of specific microorganisms.

RESULT AND DISCUSSION

Rasa sindoora was effective anti-microbial agent examined in both the methods Zone of Inhibition and Minimum Inhibitory Concentration (MIC). *Rasa sindoora* was effective against all 4 microbes.

Table 1: Zone of Inhibition

Drug	Concentration	Zone of Inhibition (MM)			
		<i>Staphylococcus aureus subsp.aureus</i>	<i>Escherichia coli</i>	<i>Pseudomonas aeruginosa</i>	<i>Salmonella Sp.</i>
<i>Rasa sindoora</i> dissolved in Dimethyl Sulfoxide	0.10mg/ ml	10	12	11	09
	0.20 mg/ml	15	17	13	13
	0.30 mg/ml	19	20	17	18
	0.50 mg/ml	24	24	20	20

Table no. 01 shows ZOI of *Rasa sindoora* dissolved in Dimethyl Sulfoxide with different concentration against microorganism. In this *Staphylococcus aureus subsp.aureus* and *Escherichia coli* show higher Zone of Inhibition at 0.50 mg/ml concentration of drug.

Table 2: MIC (Value are means of three independents replicates)

	Concentration	OD at 540 nm
<i>Rasa sindoora + Staphylococcus aureus subsp.aureus</i>	0.10mg/ ml	2.12 ± 0.5
	0.20 mg/ml	1.72 ± 0.5
	0.30 mg/ml	1.4 ± 0.5
	0.50 mg/ml	0.96 ± 0.5

Table 3:

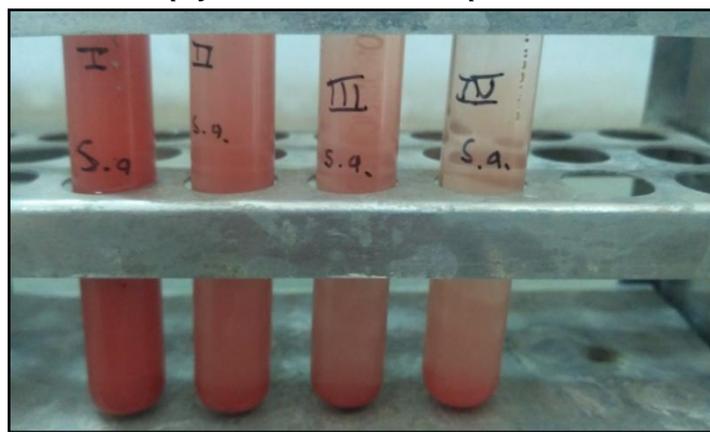
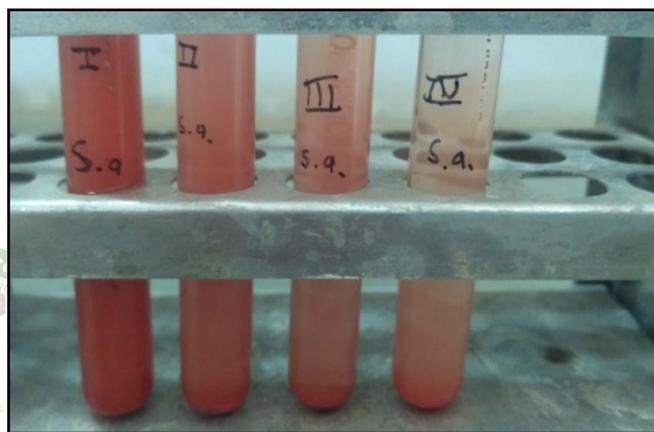
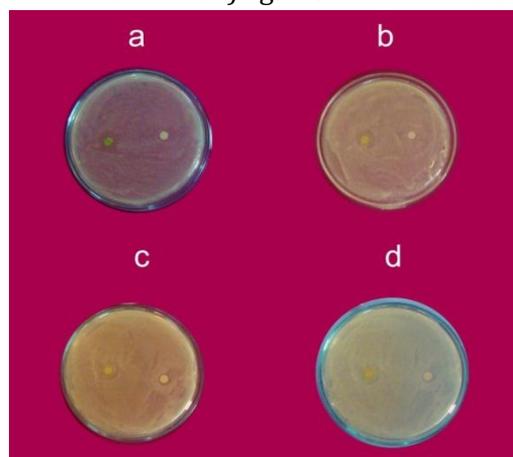
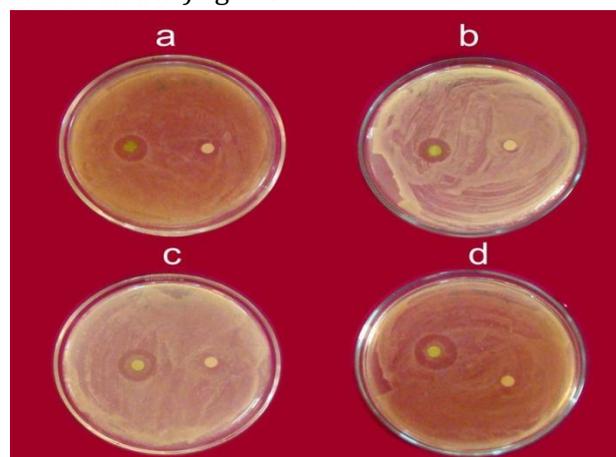
	Concentration	OD at 540 nm
<i>Rasa sindoora + Salmonella Sp.</i>	0.10mg/ ml	2.69 ± 0.5
	0.20 mg/ml	2.05 ± 0.5
	0.30 mg/ml	1.64 ± 0.5
	0.50 mg/ml	1.38 ± 0.5

Table 4

	Concentration	OD at 540 nm
<i>Rasa sindoora + Pseudomonas aeruginosa</i>	0.10mg/ ml	2.36 ± 0.5
	0.20 mg/ml	2.05 ± 0.5
	0.30 mg/ml	1.75 ± 0.5
	0.50 mg/ml	1.41 ± 0.5

Table 5

	Concentration	OD at 540 nm
<i>Rasa sindoora + Escherichia coli</i>	0.10mg/ ml	2.01 ± 0.5
	0.20 mg/ml	1.58 ± 0.5
	0.30 mg/ml	1.27 ± 0.5
	0.50 mg/ml	0.78 ± 0.5

MIC Fig.01 MIC test of *Rasa sindura* against *Staphylococcus aureus subsp.aureus*MIC Fig.02 MIC test of *Rasa sindura* against *Escherichia coli*Anti Bacterial activity of *Rasa sindura* (0.20 mg/ml concentration) against *Bacterium*Plate A - *Escherichia coli*Plate B- *Pseudomonas aeruginosa*Plate C- *Staphylococcus aureus subsp.aureus*Plate D - *Salmonella Sp.*Anti Bacterial activity of *Rasa sindura* (0.50 mg/ml concentration) against *Bacterium*Plate A - *Salmonella Sp.*Plate B- *Pseudomonas aeruginosa*Plate C- *Staphylococcus aureus subsp.aureus*Plate D - *Escherichia coli*

In Table no 02 *Staphylococcus aureus subsp.aureus* was highly sensitive to all the Concentrations of sample. It was also found that the

strain is highly sensitive to 0.50 mg/ml concentrations of sample.

In Table no 03 *Salmonella Sp.* was highly sensitive to 0.30 mg/ml and 0.50 mg/ml concentrations of sample.

In Table no 04 *Pseudomonas aeruginosa* was highly sensitive to 0.50 mg/ml concentrations of sample.

In Table no 05 *Escherichia coli* was highly sensitive to 0.20 mg/ml, 0.30 mg/ml and 0.50 mg/ml concentrations of sample.

The antibacterial properties of different formulations of *Rasa sindoora* proved the importance of compound drugs in the treatment of a number of diseases caused by microorganisms. Comparing the well and disc diffusion method for antimicrobial assay, the former gave maximum inhibition against all pathogens. In MIC value *Staphylococcus aureus subsp.aureus* and *Escherichia coli* show higher sensitive at 0.50 mg/ml concentration of sample.

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