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EVALUATION OF IN VITRO ANTIMICROBIAL ACTIVITY OF KUSTA GAJA KESARI – A SIDDHA DRUG

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Abstract: Kusta Gaja Kesari is a siddha drug consisting of metallic drug components prepared with herbal extracts which is indicated for various skin diseases like leprosy, leucoderma and chronic skin diseases in the siddha literature text “Siddha Vaithiya Thirattu”. The present study is aimed to investigate the antimicrobial activity of Kusta Gaja Kesari against gram positive, gram negative bacteria and fungal strains. The test drug kusta gaja kesari is tested and found to have maximum inhibitory zone against *Escherichia coli* and *Bacillus cereus* with 29mm and 28mm zone of inhibition, least sensitivity to *Staphylococcus aureus* and *Salmonella typhimurium* with a zone of inhibition of 19mm, 16mm respectively at a concentration of 50mg/ml. The minimum inhibitory concentration of the test drug against the microbial pathogens was also evaluated. From this study we observed that the siddha drug Kusta Gaja Kesari is an effective antimicrobial drug against gram positive, gram negative and fungal strains.

Keywords: Kusta Gaja kesari, Antimicrobial activity, Siddha, Herbo mineral drug



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INTRODUCTION

Skin disease is one of the most common Non – communicable disease in India according to WHO, which reflects the severity of the skin diseases. The major contributors of the prevalence of skin disease in India are Eczema and Psoriasis. Number of causes like pollution, Infection, UV (ultra violet radiation), Global warming and Reduction in Ozone could be listed to be the main causes of skin diseases. It is estimated that at a Compound Annual Growth Rate (CAGR) of 12% about 18.8 crore people are likely to suffer from skin disease by 2015 ^[1].

In the management of Skin diseases, usage of Anti-microbial drugs plays an essential role, which also results in treatment failure and this could be attributed to multi drug resistance which is of a great concern in the existing health care system ^[2,3]. To contribute in the scenario of increased drug resistance, there is an increase in the search of new anti-microbial herbal, metallic drugs by the drug industries ^[4].

In Siddha system of Medicine the Skin diseases are classified into the 18 types of Kuttam by the great sage, Siddhar 'Yugi Muni'. Leucoderma, Leprosy, Eczema and Fungal infections and many more skin pathologies can be included within this classification. In this study the author has aimed to study and evaluate the antimicrobial efficacy of Kusta Gaja Kesari, a siddha herbo metallic drug commonly used in the treatment of various skin diseases.

MATERIALS AND METHODS

Kusta gaja kesari was obtained from IMPCOPS pharmacy, chennai, Tamilnadu and the test organisms used in the study were obtained from MTCC, IMTECH, chandigarh (The microbiology department of IISC, Bangalore).

Preparation of test and standard solutions

The stock solution of the test drug Kusta Gaja Kesari was prepared by dissolving the dried extract in DMSO at various concentrations from 50 mg/ml, 25 mg/ml, 12.5 mg/ml to 0.09mg/ml. The stock solution of the reference standard ampicillin was prepared with sterile water at a concentration of 10mg/ml.

ANTI BACTERIAL AND ANTI FUNGAL ASSAY

The anti microbial activity was performed using cup plate method as recommended in Indian pharmacopoeia (Anonymous, 1996). The study was done against the bacterial strains of *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus Vulgaris*, *Salmonella typhimurium*, *Pseudomonas aeruginosa*, *Bacillus cereus*, *Staphylococcus aureus* and a fungal strain *Candida albicans*. The selected microbes were inoculated in a 100ml sterile nutrient broth and

incubated. Plates containing the agar medium were taken, wells of 6mm diameter were made and 0.1 ml of the inoculum was spread over it. The test drug was diluted to different levels of concentration and 0.06 ml of the test drug solution and the reference standard were added to the cups with a micropipette. All the plates were then refrigerated at 8°C for a period of 2 hours for effective diffusion of test compounds and standards. Later they were incubated for 24 hours at 37°C. The antimicrobial activity was assessed by the presence of definite zone of inhibition of any size around the cup. The solvent control was run simultaneously to assess the activity of dimethyl sulphoxide and water which were used as drug vehicles. The experiments were performed three times. The diameter of the zone of inhibition was measured and recorded [5].

RESULTS AND DISCUSSION

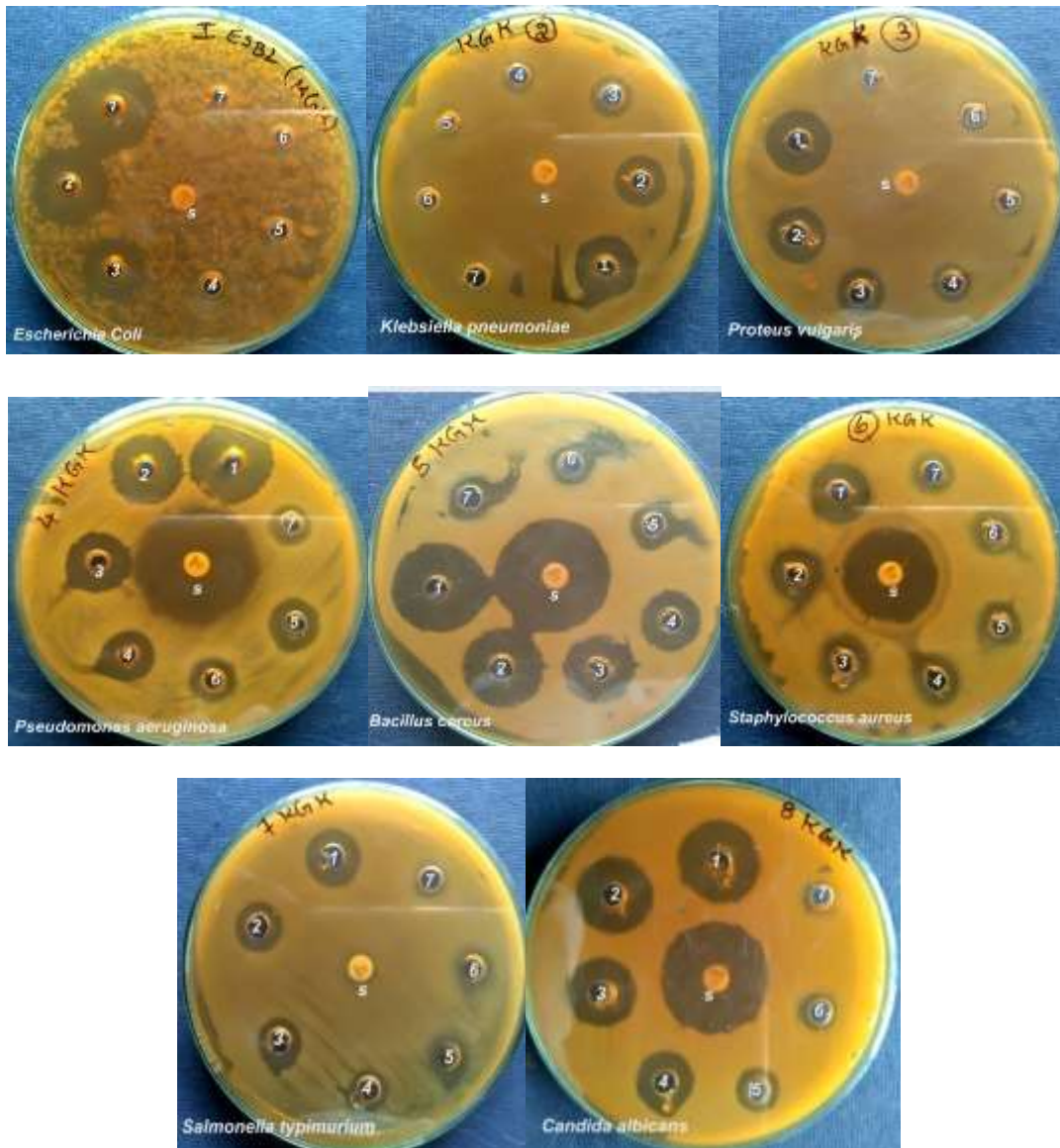
The antimicrobial activity of the test drug was evaluated against eight microbial strains, i.e five gram positive, two gram negative bacteria and one fungal strain. The results of the minimum inhibitory concentration of Kusta Gaja Kesari required to be effective against the various microbial strains and the zone of inhibition produced are given in table 1. The test drug was effective against bacillus cereus at a concentration of 0.09 mg/ml and produced an inhibitory zone of 28mm at 50mg/ml. At a concentration of 6.25mg/ml the drug was effective against Escherichia coli and at 50mg/ml concentration produced an inhibitory zone of 29mm against the same. Maximum zone of inhibition at a drug concentration of 50mg/ml against pseudomonas aeruginosa, was measured to be 27mm and 22mm diameter zone was observed against proteus vulgaris and klebsiella pneumonia. Against staphylococcus aureus and salmonella tyhimurium the zone of inhibition was 19 mm and 16mm respectively. The drug concentration to be effective against Candida albicans was 1.56mg/ml and the zone of inhibition produced against the fungal strain was 22mm at concentration of 50 mg/ml.

TABLE 1: Zone of Inhibition of the test drug against the microbes.

S.NO	ZONE OF INHIBITION – KGK (60µL/WELL)												Amp (s) mg/ml
	ORGANISM	DRUG CONCENTRATION mg/ml											
		50	25	12.5	6.25	3.12	1.56	0.78	0.39	0.19	0.09	10	
GRAM POSITIVE BACTERIA	1.	<i>Bacillus cereus</i>	28	26	23	19	16	15	14	13	11	9	+
	2.	<i>Staphylococcus aureus</i>	19	18	17	15	13	11	10	9	-	-	+
GRAM NEGATIVE BACTERIA	3.	<i>Escherichia coli</i>	29	27	16	11	-	-	-	-	-	-	-
	4.	<i>Klebsiella pneumoniae</i>	22	18	12	9	-	-	-	-	-	-	-
	5.	<i>Proteus Vulgaris</i>	22	17	13	11	9	-	-	-	-	-	-
	6.	<i>Salmonella</i>	16	12	11	9	-	-	-	-	-	-	-

		<i>typhimurium</i>											
	7.	<i>Pseudomonas aeruginosa</i>	27	25	20	18	14	11	10	-	-	-	+
FUNGAL STRAIN	8.	<i>Candida albicans</i>	22	20	16	14	12	11	-	-	-	-	+

Figure 1: Agar well diffusion method



**Drug concentration
(60µl/well)**

1. 50mg/ml
2. 25mg/ml
3. 12.5mg/ml
4. 6.25mg/ml
5. 3.12mg/ml
6. 1.56mg/ml
7. 0.78mg/ml
8. 0.39mg/ml
9. 0.19mg/ml
10. 0.09mg/ml

CONCLUSION

Kusta Gaja Kesari in Siddha medicine is mainly used to treat the various types of skin diseases. From this study we conclude that the siddha medicinal drug Kusta Gaja Kesari possess effective antimicrobial activity against gram positive, gram negative bacterial and fungal strains.

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