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ORIGINAL RESEARCH ARTICLE- EXPERIMENTAL STUDY

ANTI MICROBIAL ACTIVITY OF *BHAVITA GUDUCHI CHURNA*

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ABSTRACT

Introduction: *Guduchi (Tinospora Cordifolia)* has been reported as drug of choice in many disease conditions in Ayurveda and widely practiced for its broad spectrum therapeutics. The present study was designed to evaluate an antimicrobial activity of two samples of *Guduchi* powder treated with juice of the same drug which was prepared by two methods. **Materials and Methods:** Well Diffusion method and Broth Dilution method were adopted for present study. Recommended microbial strain like; *Staphylococcus aureus*, *Staphylococcus epidermidis*, *S. typhi, E. coli, P. aeruginosa* as well as fungi *C. albicans* were used in this study. **Results:** The samples were found active against the gram-negative bacteria *E. coli* and gram-positive bacteria *S. aureus.* The antimicrobial properties of *Swarasa Bhavita Guduchi Churna* may be due the presence of chemical compounds like; alkaloid; Berberine and a Glucoside; Giloin. **Conclusion:** *Bhavita Guduchi* showed significant antibacterial activity and its active constituents can be helpful in the therapeutic treatments.

Keywords: Anti-microbial activity, *Bhavana*, *Guduchi.*

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INTRODUCTION:

Guduchi (Tinospora cordifolia Miers., family Menispermaceae)[1] possess Rejuvenator (*Rasayana*)[2,3], Beneficial in the management of skin diseases (*Kushthaghna*)[4,5], Antimicrobial, Anthelmintic, Antiinfestant, Paraciticidal (*Krimighna, Jantughna*)[6],Useful in Erysepelas (*Visarpaghna*), *Kandughna, Vishaghna, Bhutaghna*, Antipyretic (*Jvaraghna*)[7,8] properties and is widely used in Ayurvedic therapeutics with wide spectrum of indications.[9-11] Among its classical indications, several diseases are of infectious origin or infection is major pathology in them in perspective of contemporary scientific theories. Although, Several in-vitro[12] as well as in-vivo[13] studies had concluded antimicrobial[14-17] properties [antibacterial[18] (antibacterial properties on resistant bacteria[19], Antitubercular/ antimicobacterial)[20,21] antifungal[22,23], antiviral (anti HIV)[24], paraciticidal (antimalarial/antiplasmodial)[25-27], anthelmintic properties[28-30]] of *Guduchi*, collected from different habitat[31], in different dosage forms[32], in its different extractives[33-36] of different plant parts and its isolated chemical constituents[37] along with few clinical evidences of antimicrobial, antiparacitic etc. properties reflecting infectious diseases[38-40] still, antimicrobial studies on its *Swarasa* or *Churna* or *Churnakriya* (*Guduchi Swarasa Bhavita Guduchi Churna*) are not documented yet.

Though, in Ayurvedic classics, *Swarasa Kalpana* is one of the most potent *Kalpana* among other *Kalpana*[41,42] its use in clinical practice and at industrial level is often overlooked because drugs are not available readily and perennially, it is to be used in fresh state, inconvenience to prepare at every time when needed, have less stability and short shelf life of 1 *Yama* (3 hours) and non palatable[43]. Although, *Guduchi* is quoted to be used only in fresh state but as it is not available everywhere in sufficient quantity hence in current practice, dry form is used.

Impregnation (*Bhavana Samskara*)[44] is a specific procedure to bring about desirable change in attributes of drug and used for potentiating drug attributes. The potency of single or compound drug may be further potentiated by conducting the *Bhavana* process, using their own juice or decoction. Product thus derived is termed as *Churnakriya*[45,46]. In present study, *Guduchi Swarasa* was prepared by two different methods i.e. *Guduchi Swarasa* 1 [less duration of immersion (0.5 hrs)] and *Guduchi Swarasa* 2 [more duration of immersion (12 hrs)], then from these *Swarasa* 7 *Bhavana* were given to *Guduchi Churna* to prepare 2 formulations i.e. *Swarasa Bhavita Guduchi Churna* 1 (SBGC 1) and *Swarasa Bhavita Guduchi Churna* 2 (SBGC

2) respectively. Thus, the present study was undertaken to compare antimicrobial activity of both formulations.

METHODS AND MATERIALS:

Sample preparation:

Authenticated Dry *Guduchi* was procured from Pharmacy, Gujarat Ayurved University, Jamnagar and *Guduchi Churna* (GC) was prepared of 80 meshes. Fresh *Guduchi* stems were collected from outskirts of Jamnagar and authenticated at Pharmacognosy laboratory. First sample of *Guduchi Swarasa* (GS 1) was prepared with less duration of immersion (0.5 hrs) and second sample of *Guduchi Swarasa* (GS 2) was prepared with more duration of immersion (12 hours). 7 *Bhavana* (levigation, trituration) were given to GC individually by both *Guduchi Swarasa* 1 (GS 1) for *Swarasa Bhavita Guduchi Churna* 1 (SBGC 1) and by *Guduchi Swarasa* 2 (GS 2) for *Swarasa Bhavita Guduchi Churna* 2 (SBGC 2). Antimicrobial study was carried out in Accu Prec Research Labs PVT. LTD., Gandhinagar.

Antimicrobial study-

By Well diffusion Assay:

Muller Hinton agar media was prepared and sterilized by autoclaving at 121^0C, 15 lbs. pressure for 15 minutes. Then medium was cooled to 45 – 50 ^{0}C in water bath and poured in pre sterilized Petri – plate and allowed to solidify. 01 ml of each bacterial suspension was spread over the solidified agar medium with the help of sterilized glass spreader and allowed to dry for few minutes. After inoculation small wells were punched in solidified gel with the help of sterile cork borer. These wells were then loaded with 5µg, 25 µg, 50 µg, 100 µg, and 250 µg of the sample and incubated for 18 hours at 37°C. After incubation each plate was observed for Zone of inhibition and diameter of zones were measured in mm.

Determination by Broth dilution method for Minimum Inhibitory Concentration-

Primary Screening:

In primary screening, serial dilutions of samples were prepared as 1000 µg/ml, 500µg/ml and 250 µg/ml in Muller-Hinton broth by double dilution in tubes from Stock solution of 2000 µg/ml. To each tube 0.1 ml of Inoculums is added and incubated at 37^oC for 24 hrs. The MIC is recorded by noting the lowest concentration of the drug at which there is no visible growth as demonstrated by lack of turbidity in the tube.

Secondary Screening:

Secondary Screening is done by following the procedure mention in Primary screening with sample concentrations as 200µg/ml, 100µg/ml, 50µg/ml, 25µg/ml, 12.5µg/ml and 6.25µg/ml.

RESULTS:

Observations of present study are given in table 1 to table 3.

Table 1: Effect of various concentration of SBGC 1 and SBGC 2 on microorganisms:

Well no.	Sample concentration (µg)	Bacterial Strains (Zone of inhibition in mm)							
		MTCC 443		MTCC 1688		MTCC 96		MTCC 98	
		SBGC 1	SBGC 2	SBGC 1	SBGC 2	SBGC 1	SBGC 2	SBGC 1	SBGC 2
1	5	10	10	8	8	10	10	8	10
2	25	12	12	10	10	12	14	10	10
3	50	16	18	14	15	18	16	12	12
4	100	18	18	16	18	20	20	14	16
5	250	20	22	18	20	22	22	18	18

MTCC 443: *E. coli*; MTCC 1688: *P. aeruginosa*; MTCC 96: *S. aureus*; MTCC 98: *S. typhi*

Table 2: MIC of SBGC 1 and SBGC 2 on microorganisms

Minimum Inhibitory Concentration					
Bacterial Strains	Code no	Bacterial strains			
		MTCC 443	MTCC1688	MTCC 96	MTCC 98
MIC in µg/ml	SBGC 1	100	150	100	100
MIC in µg/ml	SBGC 2	100	125	75	100

Table 3: Showing MIC of Standard anti-bacterial drugs

Drug	MTCC 443	MTCC 1688	MTCC 96	MTCC 98
(Microgram/ ml)				
Gentamycin	0.05	1	0.25	5
Ampicillin	100	-	250	100
Chloramphenicol	50	50	50	50
Ciprofloxacin	25	25	50	25
Norfloxacin	10	10	10	10

DISCUSSION:

The results obtained in the study show the growth inhibition produced by SBGC 1 and SBGC 2 on 4 species of bacteria at various concentrations. It is found that, SBGC 2 required less concentration for inhibition of microorganisms (*P. aeruginosa* and *S. aureus*) of studied strains to grow as compare to SBGC

1. Hence SBGC 2 is supposed to be comparatively more potent as that of SBGC 1. Here, for *E. coli* strain, all two samples showed Minimum Inhibitory Concentration (MIC) similar to as that of Ampicillin. For *S. typhi* strain, SBGC 1 and SBGC 2 showed MIC similar as that of Ampicillin. For *S. aureus*, all samples showed better MIC in comparison to Ampicillin. Formulation SBGC 2 can be considered as comparatively more potent antimicrobial than that of SBGC 1 at lower concentration on studied strains of *S. typhi, E. coli, P. aeruginosa* and *S. aureus*. Both samples showed higher MIC in comparison of other antibiotics except Ampicillin but therapeutic dose of sample drug is far higher than in tested concentration and then that of tested antibiotics hence may exhibit significant antimicrobial properties. The drug like *Guduchi* possess antimicrobial activity along with many other pharmacological actions, indications and is rejuvenator (*Rasayana*), Immuno-modulation, increases scope of management of infection or antimicrobial effect in different associated pathological conditions in all age groups like diabetic wounds, immunological disorders like Eczema with secondary superficial dermal infections, infections in immune-compromised patients or patients on immune-suppressants etc. Replacement of conventional antimicrobial agents with *Guduchi* or as an adjuvant therapy in clinical practice, may overcome shortcomings of conventional antimicrobial treatment like chances of microbial resistance, side effects, restriction of use in vital organ failure etc.

CONCLUSION:

Bhavita Guduchi showed significant antibacterial activity and its active constituents can be helpful in the therapeutic treatments. *Swarasa Bhavita Guduchi Churna* 2 has better antimicrobial property as compared to *Swarasa Bhavita Guduchi Churna* 1.

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