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Antibacterial potential of some herbo-mineral siddha preparation: An alternative medicine for enteric pathogens

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ABSTRACT

The Siddha system of medicine is one among the great heritage of India. In Siddha system of medicine most of the chronic diseases are cured by the medicines prepared from the metal and mineral products namely Parpam, Chendooram, Chunnam etc. In the present study some clinically used herbo - mineral siddha drugs such as Linga chendooram-1, Linga chendooram - 2, Vajerakandi, Kantharasa villai, Sandamarutham and Rasa chunnam were investigated for antibacterial potential against Escherichia coli, Salmonella typhi, Vibrio cholerae, Klebsiella pneumoniae, and Staphylococcus aureus. Study suggested that these herbo – mineral siddha preparations may be useful as an alternative medicine in the treatment of enteric bacterial pathogen.

Key words: Siddha system, herbo - mineral, antibacterial potential, enteric bacterial pathogen.

INTRODUCTION

The Siddha System of Medicine (Traditional Tamil System of medicine), which has been prevalent in the ancient Tamil land, is the foremost of all other medical systems in the world. Its origin goes back to B.C 10,000 to B.C 4,000. The uniqueness of Siddha System is evident by its continuous service to the humanity for more than 5000 years in combating diseases and also in maintaining its physical, mental and moral health while many of its contemporaries had become extinct long ago. Siddha medicine is one of the most ancient medical systems of India. Siddha is the mother medicine of ancient Tamils/Dravidians of peninsular south India. The word siddha

means established truth [1, 2] Medicinal ingredients in Siddha Vaidya are classified into three main groups: *Thavaram* (medicines derived from plants), *Jangamam* (those derived from animals), and *Thatu* (those derived from earth and organic toxins). *Thavaram* includes the thousands of whole plants and plant products. *Jangamam* includes the hundreds of animals that can be used for medicines and their products. Most of the inorganic materials are either toxic or unfit for ingestion and absorption. [3]

This system has enormous pharmacopoeia containing vegetable, animal and mineral products. Mineral drug usage should be viewed before and after Bogar's period. All siddhars are well versed in using mineral drugs [4]. Silver, gold, zinc, copper and other metals which are well known to have anti-microbial effect in modern medicines are used as wonderful life saving drugs against infectious diseases for thousands of years without any adverse effects. Role of these herbo-mineral preparations for curing skin diseases such as psoriasis, eczema, alopecia, diabetic ulcer, warts, vitiligo and leprosy are well studied [5].

The selected Siddha medicines for investigation mainly consist of Cinnabar. Cinnabar is one among the one of mercury having a molecular weight of 232.65.It is soluble only in Aqua regia. It is considered to be the safest mineral which along friends its place in Balavakadam (Siddha pediantries). It has been proved to be anti inflammatory, Analgesic and anti-Pyretic. It is considered to be the highly efficacious drug in combating peptic ulcer and disease of Vettai megam [4]. The main composition of cinnabar is HgS, which accounts for almost 96%. The other components include MgS, Bi, Fe, Si, Ba, Ca, Cu, Mn, Sb, As, etc. As cinnabar includes mercury element, it is considered as the toxic substance, and it is suggested to carefully apply for clinical therapy [6, 7, 8]. For this reason, all inorganic minerals and metals are broken down into fine particles and combined with organic plant products. This process detoxifies the *thathu* (mineral) and makes it easy for the digestive system to assimilate [3].

There are a limited numbers of *in vitro* studies on herbo - mineral preparations. Therefore, there is a need to identify antibacterial potential of herbo - mineral products based on diseases for which no medicine or only palliative therapy is available. At this juncture, it is of interest to determine the scientific basis for the traditional use of these herbo - mineral medicines and to evaluate the antibacterial potential of herbo – mineral preparations against enteric bacterial infection.

EXPERIMENTAL SECTION

Mineral-Based Herbal Medicines [Chendooram and Chunnam] such as Linga chendooram-1, Linga chendooram -2, Vajerakandi, Kantharasa villai, Sandamarutham and Rasa chunnam were procured from local market and Siddha practitioners. These commercially available formulations are used for treating various diseases in traditional clinical practice in India and are usually prepared from purified mineral and mercury, triturated with decoction of herbal juices. They are generally prescribed in the dose of 100-200 mg day-1 and recommended to be taken with a suitable adjuvant.

The standard pathogenic bacteria cultures were procured from IMTECH, Chandigarh, India and used in the present study (Table1). The bacterial cultures were rejuvenated in Mueller- Hinton broth (Hi-media laboratories, Mumbai, India) at 37^0 C for 18h and then stocked at 4^0C in Mueller

- Hinton Agar. The inoculums size of the bacterial culture was standardized according to the National committee for Clinical Laboratory Standards guideline [9]. The pathogenic bacterial culture was inoculated into sterile Nutrient broth and incubated at 37^0 C for 3h until the culture attained a turbidity of 0.5 McFarland units. The final inoculums size was standardized to 10^5 CFU/mL with the help of SPC and Nepheloturbidometer.

Table: 1. Antibacterial Potential of herbo – mineral preparations against various enteric bacterial pathogens at 1 mg, 2 mg, 3 mg, 4 mg/disc. (Zone of inhibition of growth in mm)

Selected Siddha herbo- mineral preparation	**Concentration**	***E. coli***	***S. typhi***	***K. pneumoniae***	***S. aureus***	***V. cholerae***
Linga Chendooram(1)	1 mg	10	12	13	8	10
	2 mg	24	13	14	19	24
	3 mg	25	16	19	22	25
	4 mg	32	18	22	26	32
Linga Chendooram(2)	1 mg	11	10	15	8	11
	2 mg	25	12	16	17	21
	3 mg	26	15	18	20	22
	4 mg	33	19	21	24	29
Vajira Kandy	1 mg	16	18	21	18	13
	2 mg	19	22	23	20	20
	3 mg	21	23	24	21	21
	4 mg	22	24	25	22	24
Kantha Rasa villai	1 mg	17	18	13	19	18
	2 mg	24	22	16	22	22
	3 mg	28	24	18	25	25
	4 mg	30	27	22	27	27
Sanda Marutham	1 mg	15	19	22	19	16
	2 mg	20	23	24	21	20
	3 mg	22	24	25	22	23
	4 mg	23	25	26	23	26
Rasa Chunnam	1 mg	8	8	8	8	8
	2 mg	10	10	10	10	10
	3 mg	10	11	12	11	11
	4 mg	11	12	13	12	12
Negative Control	1 mg	-	-	-	-	-
	2 mg	-	-	-	-	-
	3 mg	-	-	-	-	-
	4 mg	-	-	-	-	-
Positive control	Streptomycin 10 mcg/disc	32	29	15	21	18

Antibacterial Activity using disc diffusion method:

The modified paper disc diffusion method [9] was employed to determine the antibacterial activity of herbo – mineral preparations. Turbidity of inoculums was matched with McFarland turbidity standard. Inoculums were spread over the Nutrient agar plate using a sterile cotton swab in order to get a uniform microbial growth. Then the prepared antibacterial disc were placed over the lawn and pressed slightly along with positive and negative controls. Streptomycin10mcg/disc (9Hi-Media, Mumbai) was used as positive control Disc soaked in sterile distilled water was placed on lawns as negative control. The plates were incubated for 18h at 37^0C. The antibacterial

activity was evaluated for 1 mg, 2 mg, 3 mg, 4 mg/disc and diameter of inhibition zones were measured and recorded.

RESULTS AND DISCUSSION

Metallic herbal preparations offer advantages over plant drugs by virtue of their stability over a period, lower dosage, easy storability, and sustained availability as it contain minerals and metals as integral part of the formulations [10]. The metals and minerals are mixed with herbs because they are considered non-living and by treating them with herbs they are converted to a living state thereby becoming bio-compatible [11]. The same mineral and mercury processed with different herbs acts on different organs in the human body.

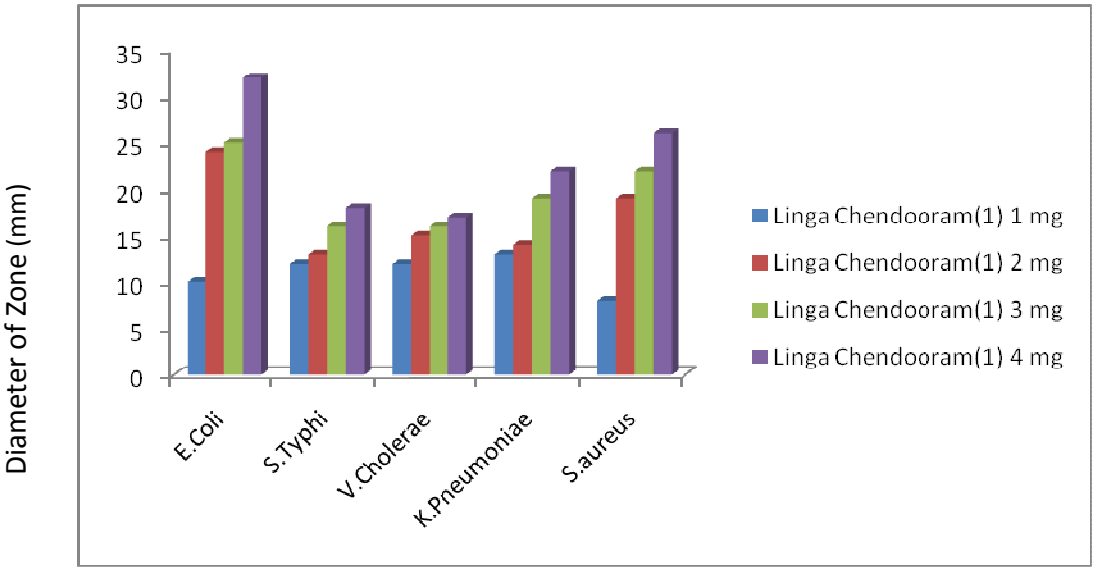

Fig.1: Antibacterial activities of Linga Chendooram(1) against various bacterial pathogens

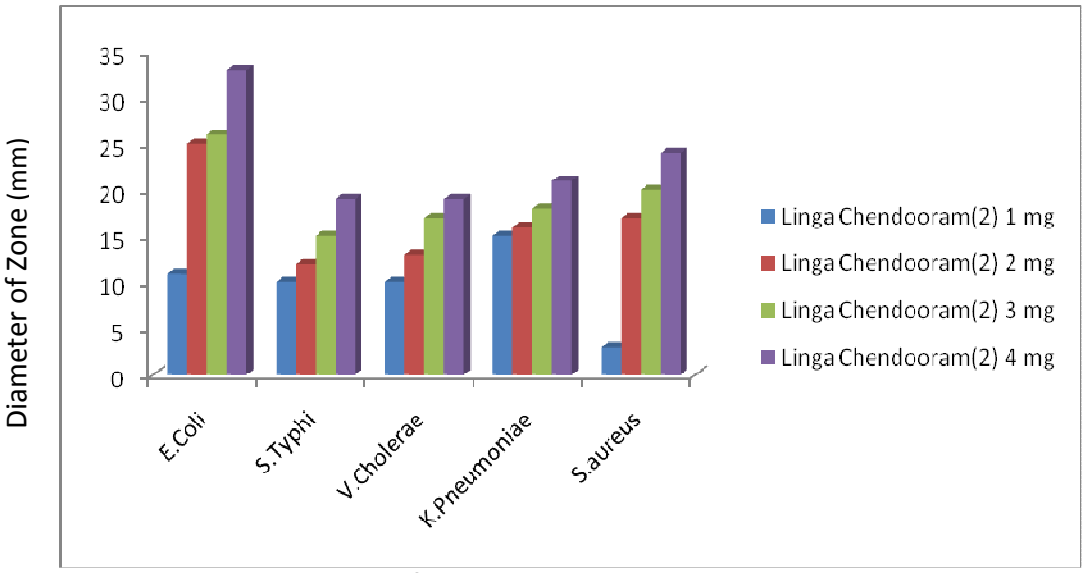

Fig.2: Antibacterial activities of Linga Chendooram(2) against various bacterial pathogens

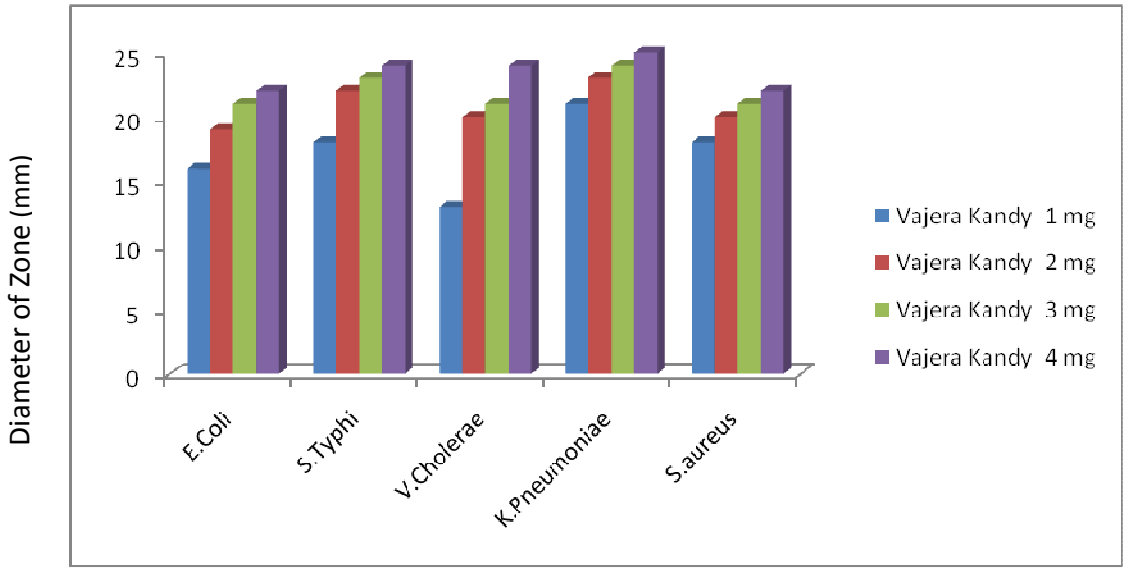

Fig.3: Antibacterial activities of Vajera Kandy against various bacterial pathogens

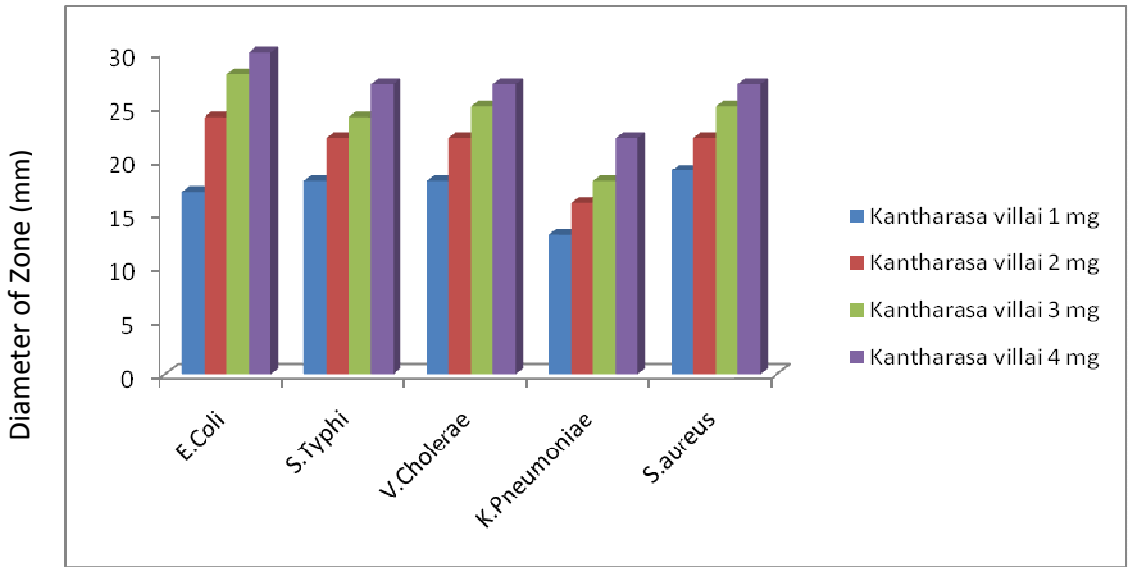

Fig.4: Antibacterial activities of Kantharasa villai against various bacterial pathogens

According to the antibacterial activity of herbo – mineral preparations (Table 1), Linga chendooram are used to treat fevers, skin diseases and also venereal diseases. It is given along with honey in a dose of 50 – 100mg/day. Linga chendooram is derived from cinnabar. It has been widely used in clinical therapy [12]. It was observed that both Linga chendooram-1 and Linga chendooram-2 were found strong antibacterial activity against *E.coli*, *S.aureus*, *K.pneumoniae* and moderate anti bacterial activity against *S.typhi* and *V.cholerae* at 3 and 4mg concentration [Fig-1,2].

Vajerakandi is a mineral based siddha preparation. In this preparation cinnabar, calomel and Hydrargrum per chloride corrosive sublimate are purified and used. These herbomineral preparations used to treat fevers, body pain, Arthritis and posses wound healing propriety.

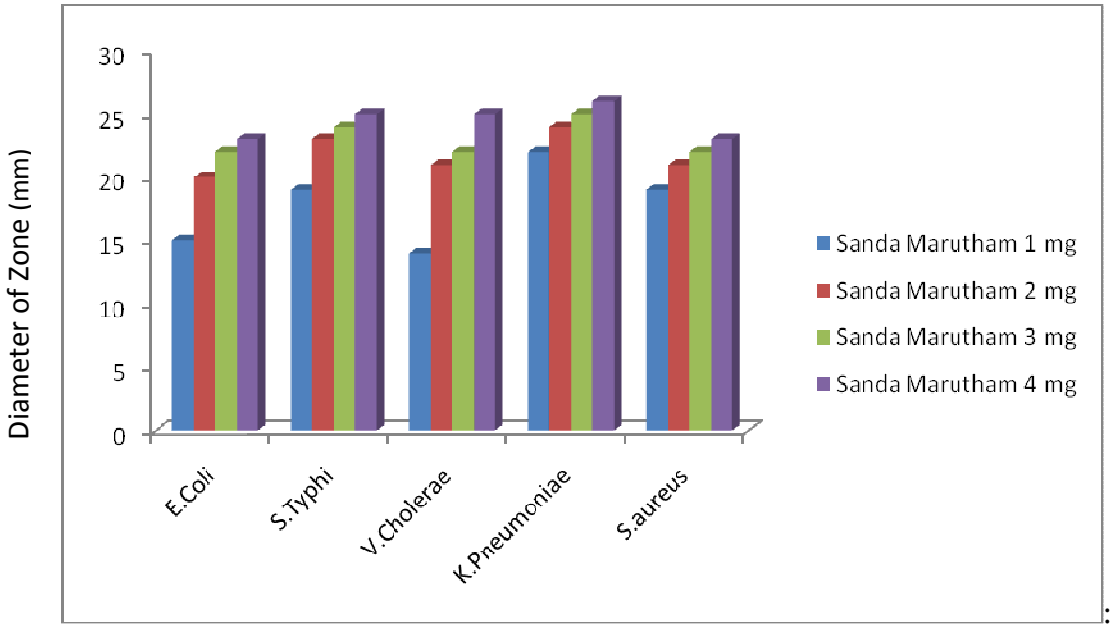

Fig: 5 Antibacterial activities of Sandamarutham against various bacterial pathogens

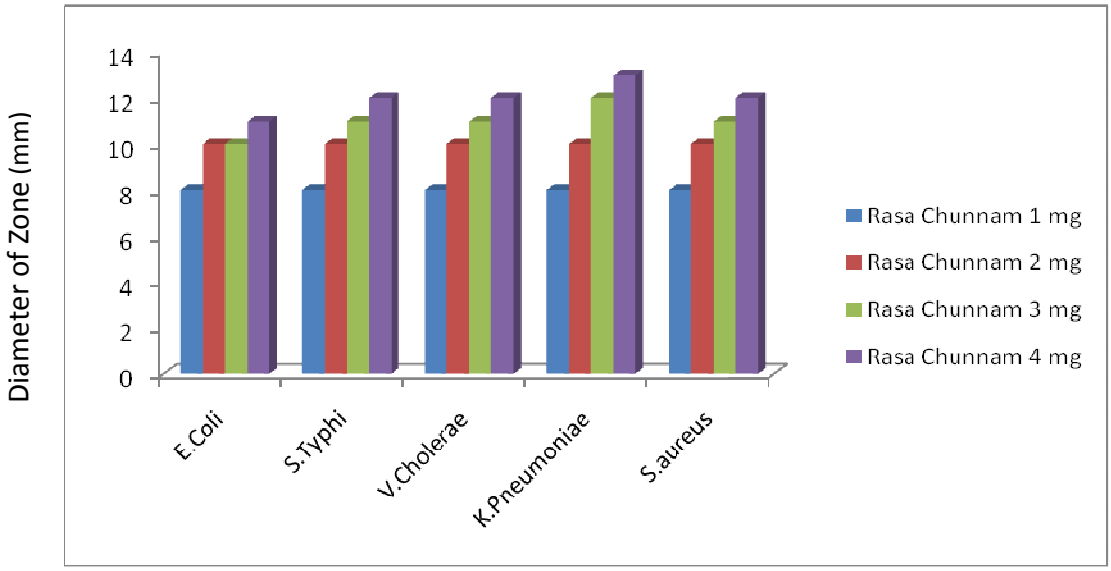

Fig.6: Antibacterial activities of Rasa Chunnam against various bacterial pathogens

Vajerakandi was found to have strong anti bacterial actiity against *K.pnumoniae, V.cholerae, S.typhi, E.coli and S.aureus* at 2, 3,4mg concentrations [Fig- 3]. Kantharasa villai is useful in skin diseases, cancer, gastric and arthritis. These herbo mineral drugs are prepared from purified mercury, cinnabar, white arsenic, camphor, magnet and other plant material. It was found strong anti bacterial activity against *E.coli, Vibiro cholorae, S.aureus, S.typhi* and *K.pneumonial* at 2, 3,4mg concentration and Mild antibacterial against K.*pneumoniae* at 1 and 2mg concentration [Fig-4].

Sandamarutham is prepared from purified cinnabar, calomel, Hydrargrum per chloride corrosive sublimate and sulphur. It is useful in fevers and gastric problem, Sandamarutham was strong

antibacterial against various pathogens at different concentrations [Fig-5]. Rasa chunnam is used to enhance immunity. It is prepared from purified mercury, egg shell, Alam and nitric acid. Rasa chunnam was found to show moderate anti bacterial activity against S.*aureus, K.pneumoniae, V.cholerae and S.typhi* at 2, 3, 4mg concentrations against various pathogen at1mg concentrations [Fig-6].

CONCLUSION

Our findings suggest that, Siddha herbo mineral preparations have great potential as anti microbial agent against many enteric pathogens. The speciality of Siddha drugs is its adaptogenecity. The same drug can be prescribed successfully for various diseases simply by changing the vehicle accordingly. Thus these herbmineral preparations can used to control or prevent the enteric bacterial preparation and can be used to control or prevent the enteric bacterial infection. Further research is deserved to identify the compounds responsible for the observed antibacterial activity.

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