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The antibacterial potential of clinically used herbal decoctions available in India

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ABSTRACT

Due to side effects of synthetic products, herbal products are gaining popularity in the world market. Herbal remedies have been used for the prevention and treatment of disease and for healing purposes since before the beginning of human civilization. The purpose of this experiment was to determine the antibacterial effect of herbal decoctions available in Market against enteric bacterial pathogens. Some herbal decoctions were procured from the local market such as Gokharu kadha (Sandu Brothers), Triphala kadha (Sandu Brothers), Mahamanjishtadi kadha (Baidyanath), Mahasudarshan kadha (Baidyanath), The aqueous solutions of these decoctions were prepared and then tested for their antibacterial activity against enteric pathogens such as *Escherichia coli*, *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa* *Salmonella typhi*, *Staphylococcus epidermidis* and *Proteus vulgaris*. A simple disc diffusion method was employed. Overall, the Herbal decoctions exhibited good antibacterial effects on the enteric pathogens. Mahasudarshan kadha shows a higher antibacterial effect against *Pseudomonas aeruginosa*, *Salmonella typhi* and *staphylococcus epidermidis*. Mahamanjishtadi kadha shows significant antibacterial effect on the *Staphylococcus epidermidis*.

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KEYWORDS

Antibacterial activity;
Herbal decoctions;
Enteric bacterial pathogens.

INTRODUCTION

In India, a number of plant extracts are used against diseases in various systems of medicine such as Ayurveda, Unani and Siddha. Only a few of them have been scientifically explored. Plant derived natural products have received considerable attention in recent years due to their diverse pharmacological activities^[8]. The Ayurvedic approach to the prevention and treatment of microbial infection recognizes the emergency use of

modern drugs, but recommends traditional herbal combinations and extracts known to balance the individual and improve health, as well as herbs that help to combat or prevent microbial infections^[1].

Thus, majority of the world's population in developing countries still rely on herbal medicine to meet their health needs^[7]. Although the World Health Organization supports the appropriate use of herbal medicine and encourages the use of safe and effective remedies, it has also stated that most herbal medicine needs to be

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studied scientifically^[2]. WHO has therefore published guideline with the main purpose of defining the basic criteria for evaluation of quality, safety and efficiency of herbal medicine and thus assist researchers and others to undertake documentation in respect of such products, since the major criticism usually levelled against traditional healers is that their portions are not standardized, documented, specified and dosage are imprecise^[4].

The effect of herbal compounds and Phytochemical on pathogenic bacteria has been well studied. At this time, the effect of herbal decoctions on enteric pathogenic bacteria has not been extensively studied. When evaluating the efficacy of herbal medicine concerning the antibacterial potential, extract of the herbs typically have been used. These are normally obtained by means of steam distillation, maceration; soxhlet and supercritical fluid extraction with hexane^[3]. These types of preparations are normally unavailable to person in a domestic setting for purposes of self medication. Instead, aqueous solution (e.g. infusions and decoctions) that are prepared in the home according to recipes found in herbal are most frequently used^[6].

This study investigated the reputed efficiencies of an herbal decoction which has been experienced and passed on from one generation to the other in some part of India. The present study is in pursuance of the assessment and verification of the scientific basis of some known and claimed practices in herbal medicine in developing country. Aim of this study is to examine the antibacterial activities of a clinically used Herbal decoction against some common human pathogens

MATERIALS AND METHOD

Collection of sample

Herbal decoctions like Triphala kadha, Mahamanjishtadi kadha, Mahasudarshan kadha, Gokharu kadha were purchased from the local market of Amravati (M.S. India).

Bacterial cultures

The standard pathogenic bacterial cultures were procured from IMTECH, Chandigarh, India and used in the present study (TABLE 1). The bacteria rejuvenated in Mueller- Hinton broth (Hi-media laboratories,

TABLE 1: Bacterial cultures used in study (IMTECH, Chandigarh, India)

Bacterial pathogens	MTCC number
<i>Proteus vulgaris</i>	426
<i>Staphylococcus epidermidis</i>	435
<i>Staphylococcus aureus</i>	96
<i>Escherichia coli</i>	739
<i>Pseudomonas aeruginosa</i>	424
<i>Salmonella typhi</i>	733
<i>Enterobacter aerogenes</i>	111
<i>Salmonella typhimurium</i>	98

Mumbai, India) at 37°C for 18 hrs and then stocked at 4°C in Mueller-Hinton Agar. Subcultures were prepared from the stock for bioassay. A loopful of culture was inoculated in 10mL of sterile nutrient broth and incubated at 37°C for 3 hrs. Turbidity of the culture was standardized to 10⁵ CFU with the help of SPC and turbidometer.

Screening of the herbal decoctions for antibacterial activity

For antibacterial activity 0.1ml bacterial suspension of 10⁵ CFU ml-1 was uniformly spread on Nutrient Agar plate to form lawn cultures. The Herbal decoction was evaporated under reduced pressure and dried using a rotary evaporator at 60°C to remove the self generated alcohol. Dried extract were stored in labeled sterile screw capped bottles at 4°C. and later used for the *in vitro* study. The dry extracts of herbal decoction were dissolved in sterile water in such a manner that ultimate amount (in dry form) in each disc came to 10mg, 8mg, 6mg, 4mg and 2mg. The blotting paper discs (10mm diameter) were soaked in diluted extract, dried in oven at 60°C to remove excess of solvent and tested for their antibacterial activity against bacterial pathogens by disc diffusion technique^[5]. After incubation of 24 hr at 37°C, zone of inhibition of growth was measured in mm. Ampicillin 10mcg (Hi-Media disc) was used as positive control while discs soaked in distilled water and dried were placed on lawns as negative control.

RESULT AND DISCUSSION

Herbal medicines have genuine utility and over 80% of rural population depends on it for primary health care. The World Health Organization has been advocating the needs for orthodox medical practitioners to interact

Full Paper**TABLE 2 : Antibacterial potential of a herbal decoction available in India (Zone of inhibition in mm average of 3 reading)**

Bacterial Pathogens	Gokharu kadha					Triphala kadha					Mahamanjishtadi kadha			Mahasudarshan kadha			controls					
	10mg/disc	8 mg/disc	6mg /disc	4mg /disc	2mg /disc	10mg /disc	8mg /disc	6mg /disc	4mg /disc	2mg /disc	10mg /disc	8mg /disc	6mg /disc	4mg /disc	2mg /disc	10mg /disc	8mg /disc	6mg /disc	4mg /disc	2mg /disc	DW	Ampicillin (10mcg)
<i>P.vulgaris</i>	15	14	13	12	-	16	15	14	13	12	12	11	-	-	-	18	17	15	14	11	-	16
<i>S.epidermidis</i>	19	17	16	15	14	20	18	16	15	13	17	15	14	13	12	16	14	12	11	-	-	25
<i>S.aureus</i>	21	18	17	15	12	23	20	19	16	15	20	18	17	15	14	17	15	14	--	-	-	24
<i>E.coli</i>	14	13	12	-	-	--	-	-	-	-	-	-	-	-	-	15	13	12	-	-	-	17
<i>P.aeruginosa</i>	22	20	19	17	15	12	11	-	-	-	-	-	-	-	-	13	12	11	-	-	-	16
<i>S.typhi</i>	17	16	15	14	13	20	18	17	15	13	13	12	11	-	-	23	2	19	17	16	-	18
<i>E.aerogenes</i>	-	-	-	-	-	-	-	-	-	-	12	11	-	-	-	11	11	-	-	-	-	30
<i>S.typhimurium</i>	-	-	-	-	-	15	14	13	12	-	15	14	13	1	11	22	19	17	16	15	-	18

with traditional herbal healers with a view to identifying and exploiting aspects that provide safe and effective remedies for ailments of both microbial and non-microbial organisms^[9]. The present study has demonstrated that the test decoction has antibacterial properties against bacterial pathogens. Discussion with herbal medicine practitioners in India revealed that they normally use the decoction in the treatment of skin and enteric infection.

This is in conformity with the result obtained in this study; since the decoction is found to possess antibacterial properties against *Escherichia coli*, *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa* *Salmonella typhi*, *Staphylococcus epidermidis* and *Proteus vulgaris* which are some of the organisms associated with enteric infection. No previous scientific study has been carried out on the herbal decoctions studied. Thus this study presents a preliminary report of the efficacy of this herbal decoction used by people in the treatment of common bacterial infection. This study has therefore offer a scientific basis for the use of this herbal decoction in the treatment of superficial and associated bacterial infections.

The profile of the herbal decoctions used in this study as represented in TABLE 2. The antibacterial properties of herbal decoctions namely Triphala kadha, Mahamanjishtadi kadha, Mahasudarshan kadha, Gokharu kadha. Were tested using disc diffusion method. The obtained result of Gokharu kadha shows maximum antibacterial activity against *S.aureus*, *P.vulgaris*, *P.aeruginosa* and *S.typhi*, where it was no or negligible effect against *E.aerogenes* and *S.typhimurium*. Triphala kadha shows highly antibac-

terial potential against *P.vulgaris*, *S.aureous* and *S.epidermidis*, it was mild effect against *S.typhi* and no inhibitory effect against *E.coli*, *E.aerogenes*. In case of Mahamanjishtadi kadha was found highly antibacterial potential against *S.aureus* and *S.epidermidis* and *S.typhimurium*, but it was mild effect against *S.typhi* and no inhibitory effect against *E.coli*, *E.aerogenes*. Mahasudarshan kadha shows highly antibacterial activity against *S.aureus*, *P.vulgaris*, *P.aeruginosa* and *S.typhi*, but least potential against *E.aerogenes*

CONCLUSION

It is clear that herbal decoctions namely Triphala kadha, Mahamanjishtadi kadha, Mahasudarshan kadha, Gokharu kadha used by people against diarrhea/enteric infection showed antibacterial activity. The present study suggests that herbal decoctions such as Triphala kadha, Mahamanjishtadi kadha, Mahasudarshan kadha, Gokharu kadha are antibacterial against enteric and diarrheal bacterial pathogens. The results of present study support the traditional usage of the studied decoctions and suggest that some of herbal decoctions possess compounds with antibacterial properties that can be used as antibacterial agents for the therapy of infectious diseases caused by enteric pathogens.

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