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ANTIMICROBIAL ABILITY OF CURCUMA LONGA EXTRACT CLOTH AS ANTIBIOTIC ENVIORNMENT

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ABSTRACT

Plants are wealthy in numerous secondary metabolites and are a most important source of chemical diversity; therefore, they are a potential source of new drugs for man whose use to control diseases. *Curcuma longa* (turmeric) has been shown to inhibit the growth of numerous microorganisms, including bacteria, viruses, and fungi. The present study was performed to screen antimicrobial efficacy of *Curcuma longa* by preparing antimicrobial cloth from the plant extract of *Curcuma longa.* Turmeric plant extract shows good antimicrobial activity against fungi. Cloth prepared with *C. longa* plant extract gives good result against *A. niger* (IZ= 0.275, AI= 0.008) after 5 wash. Cloth prepared with *C. longa* plant extract give good result against *A.flavus* after 20 wash (IZ=0.54, AI= 0.019). Therefore, in present research attempts were made to generate new dimensions for potentials cloths with *C. longa* plant extracts and it is note worthy that this cloth possess antimicrobial potentials against pathogenic fungi and can be work as safe and antibiotic environment for future generations.

KEYWORDS: ***Curcuma longa*, Antimicrobial activity, Antimicrobial cloth, Antibiotic environment**

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INTRODUCTION

Ethnopharmacology, an area inside ethnobotany paying attention on the medicinal use of plants, is important in selecting raw materials for future drugs and studying bioactive chemical entities from natural sources. Plants are rich in several secondary metabolites and are a major source of chemical diversity; therefore, they are a potential source of new drugs for man whose use to control diseases. Plant materials are of wide use in traditional systems of medicine, and in several communities of the developing world, are the only resources available for the treatment of different infections. Researchers recently reported the rationale for further development of ethnic/traditional medicine. Thus, innovative scientific methods for the discovery and validation of multicomponent botanical therapeutics are important for the development of medicine and both the standardization of extracts and the identification of the efficient chemical and/or biological compounds; therefore, emphasis must be placed on the preservation of plant populations to guarantee pharmacologically active sources of material for herbal medicine[1]. Clinical microbiologists are interested in the antimicrobial activity of plant extracts. Phytochemicals isolated from plant extracts have antimicrobial potentials and some of them are being used as potential drugs for the treatment of various diseases. It is reported that each year two or three antibiotics derived from microorganisms are launched but the effective life span of any antibiotic is limited[2]. So now there is an urgent need for new sources of antibiotics, plant sources are being investigated for the search of novel antibiotic compounds[3]. Chemical compounds isolated from plant sources used as potential therapeutic compounds with least side effects. Therefore, in the present study attempts were made to screen antimicrobial efficacy of *Curcuma longa* by preparing antimicrobial cloth from the plant extract of *Curcuma longa.*

Curcuma longa (turmeric) is a rhizomatus herbaceous perennial plant of the ginger family, Zingiberaceae. It is native to tropical Indian Subcontinent and needs temperatures between 20^0C and 30^0C and a considerable amount of annual rainfall to thrive. Plants are gathered annually for their rhizomes, and propagated from some of those rhizomes in the following season.

Chemical composition of turmeric

Turmeric is chemically diverse in composition. Turmeric is a great source of many different qualitative and quantitative compounds. The composition of chemical constituents of turmeric varies with the variety and location of the spice. Calebin-A, vanillic acid, and vanillin are other phenylpropene and phenolic compounds identified from turmeric. The essential oils from leaves and flowers are usually dominated by monoterpenes. The most common monoterpenes present in turmeric are *p*-cymene, β-phellandrene, terpinolene (terpenoline), *p*-cymen-8-ol, cineole, and myrcene. Dried turmeric rhizomes usually yield 1.5–5% essential oils, which are dominated by sesquiterpenes and are responsible for its aromatic taste and smell. The most common sesquiterpenes identified from turmeric are α-turmerone, β-turmerone, turmeronol A, and turmeronol B[4].

Antimicrobial activity

Plant extracts of turmeric posses antimicrobial activity and inhibit the growth of various microorganism including bacteria, viruses and fungi. Turmeric showed antimicrobial activity against many pathogenic bacteria that are responsible for the development ulcers, gastric and colon cancers and many more. In a few cases, turmeric has been shown to act as a preservative by retarding microbial growth. At a 5% concentration, turmeric exhibited antimicrobial activity against histamine-producing bacteria. Turmeric extract has also shown activity against food-borne pathogens. The bactericidal activities of

turmeric against a *Escherichia coli* strain were reported by another study[5]. Turmeric possesses antiviral activity. In one study, the spice inhibited hepatitis B virus replication in liver cells by enhancing the level of p53 protein. Turmeric exhibits antifungal activity against numerous strains of fungus. This spice can also inhibit aflatoxin, a deadly toxin from a fungus common to peanuts.

MATERIALS & METHODS

(A) Collection of plant material

Experimental plant materials were collected from fields.

(B) Preparation of plant extracts

The collected plants were shade dried and finely powdered. Different plant parts were extracted with constant agitation for 48 hrs. The extracts were filtered using Whatman No. 1 filter paper and then concentrated *in vacuum* at 40 °C using a Rotary evaporator and stored at 4°C[6,7].

(C) Microorganism used

Bacterial and Fungal strains were purchased from IMTECH, Chandigarh, India. *Escherichia coli* (MTCC730), *Staphylococcus aureus supsp. aureus* (MTCC 1144), *Aspergillus flavus* (MTCC 277), *A. Niger* (MTCC 281), and cultured.

(D) Preparation of culture medium (a) For Bacterial culture

The culture medium used for the culture of bacteria is nutrient agar and nutrient broth. [8] The media was prepared by adding different constituents of media (Beef Extract 3.0 g + Peptone 5.0 g + Agar 15.0) The constituent of media were dissolved in one liter distilled water and autoclaved at 15 lbs for 15-20 minutes then the 25-30 ml medium was poured in sterilized Petri-plates under aseptic conditions in Laminar Air flow chamber. The bacterial suspension was prepared in nutrient broth (Beef Extract 3.0 g + Peptone 5.0 g).

(b) For Fungi culture

Potato dextrose agar medium (PDA) was prepared for the cultivation of fungus. The constituents of PDA medium (Potato Starch 4.0 g + Dextrose 20.0 g + Agar 15.0 g) were dissolved in one liter distilled water and autoclaved at 15 lbs for 15-20 minutes then the 25-30 ml medium was poured in sterilized Petri plates under aseptic conditions in Laminar Air flow chamber. The Fungal suspension was prepared in PDA broth (Beef Extract 3.0 g + Peptone 5.0 g).

Preparation of cloth-

Scouring solution- 3% NAOH was prepared (15 gm NAOH pellets in 500 ml distilled water)

Bleaching Solution- 3% H2O2 was prepared (15 ml H2O2 in 500 ml distilled water)

Procedure- Dip the cloth in scouring solution for 10 minutes & dry for half an hr. ThenDip the cloth in bleaching solution for 10 minutes & dry for half an hr. Scoured & Bleached cloth is dipped in plant extract for overnight.

Activity index: (Formula)

Activity Index (A.I.)- Inhibition zone by test compound / Std.zone.

Std.zone (amp) in E.coli: 16 mm

Std.zone (amp) in S.aureus: 20 mm

Std.zone (fluconazole) in A.niger:32 mm

Std. zone (fluconazole) in A.flavus:28 mm

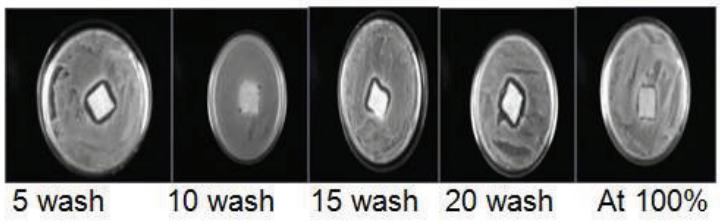
OBSERVATIONS & RESULTS

The present study concluded that *Curcuma longa* shows antimicrobial activity against the pathogenic fungus and could be useful in curing the diseases of human as well as the animals to some extent.

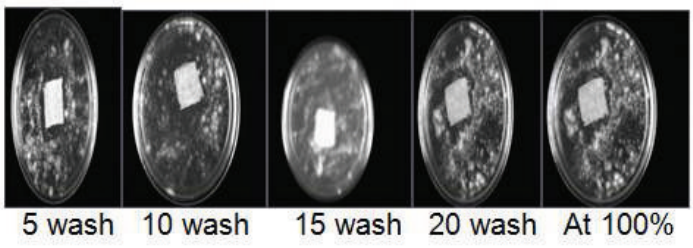
Table showing inhibition zone in plant extract of Curcuma longa

Microorganisms	Concentration	Mean value of zone of Inhibition	A.I.
E.coli	5	-	-
	10	-	-
	15	-	-
	20	-	-
	100	-	-
S.aureus	5	-	-
	10	-	-
	15	-	-
	20	-	-
	100	-	-
A.niger	5	0.275	0.008
	10	0.245	0.007
	15	0.2	0.006
	20	0.245	0.007
	100	0.25	0.007
A.flavus	5	0.405	0.014
	10	0.2	0.007
	15	0.37	0.013
	20	0.545	0.019
	100	0.34	0.012

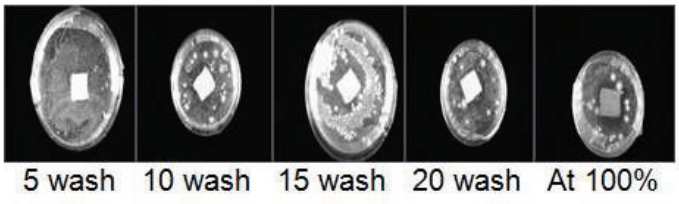
Results- Antimicrobial activity of antimicrobial cloth prepared by *C. longa* plant extract after 5 wash, 10 wash, 15 wash, 20 wash and at 100% against ***A.flavus***.



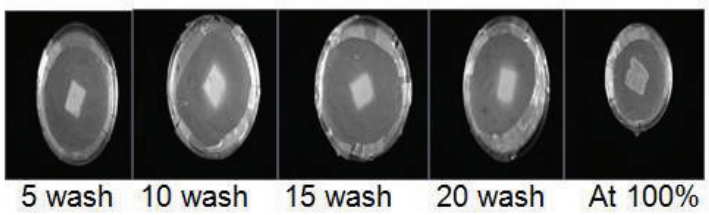
Results- Antimicrobial activity of antimicrobial cloth prepared by *C. longa* plant extract after 5 wash, 10 wash, 15 wash, 20 wash and at 100% against ***A.niger***.



Results- Antimicrobial activity of antimicrobial cloth prepared by *C. longa* plant extract after 5 wash, 10 wash, 15 wash, 20 wash and at 100% against ***E. coli***.



Results- Antimicrobial activity of antimicrobial cloth prepared by *C. longa* plant extract after 5 wash, 10 wash, 15 wash, 20 wash and at 100% against ***S. aureus***.



CONCLUSION

Plant extract of *Curcuma longa* demonstrate good antimicrobial activity against fungi. Hence, in present investigation, attempts were made to create new magnitude for potentials cloths with *C. longa* plant extracts against pathogenic fungi and it is admirable that this cloth acquire antimicrobial potentials and effort as safe and sound antibiotic atmosphere for upcoming creation.

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