

ANTIMICROBIAL ACTIVITY OF THE EXTRACTS OF RHIZOME OF CURCUMA LONGA AND CURCUMA AMADA

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Abstract

Traditional medicine is the primary source of treatment for a wide range of afflictions. The current issues associated with antibiotics have sparked an increased interest in flora that possess antimicrobial properties. Examining the benefits of *Curcuma longa* and *Curcuma amada*'s antibacterial properties is the study's goal. In terms of technique, the diffusion of agar discs was used to carry out the antimicrobial test. According to the research, the antibacterial activity of the extracts of the rhizome of *Curcuma caesia*, hexane, and chloroform was much higher than that of a typical medication. While compared to the seeds of *Curcuma longa* and *Curcuma plant amada*, the plant extracts demonstrated a better zone of resistance against gramme Gram-negative bacteria than gramme positive pathogens. In a variety of research investigations, curcuminoids have demonstrated a variety of bioactivities and promising results.

Keywords: Rhizome extracts, *Curcuma longa*, *Curcuma amada*, antimicrobial activity

1. Introduction

In classical Hindu medicine, it is often used to treat injury-related sprains and swelling. Modern traditional Indian medicine has begun to use the extract of turmeric to treat a variety of conditions, including biliary issues, the condition, jams, coryza, diabetes, hepatic diseases, joint pain, and sinuses (Windarsih et al., 2021). A cultigen with likely Indian origins, turmeric (*Curcuma longa* L.) is widely used as a spice and a yellow and orange colour (Sutar et al., 2020). Some of the many uses for turmeric include curry powder, chicken broth, sauces, stews, dry spices (Kumari et al., 2020), and backing mixtures, cheese processing pickles, embraces, a batter soups, drinks, and sweets (Borah et al., 2020). Its other uses include bio pesticides, medicinal, and religious contexts. (Furmuly and Azemi, 2020).

Mango ginger (*Curcuma amada*) is a fragrant rhizomatous plant belonging to the the group of Zing tribe (Paramita et al., 2021). It is cultivated in “India, Sri Lanka, Bangladesh, and numerous South-East Asian countries for its rhizomes” (Wahyuni et al., 2019), which are used as a flavoring for sauerkraut along with various foods, in addition to their therapeutic qualities (Sunday et al., 2021). Infectious infections can only be effectively treated using antimicrobial medicines (Higgins et al., 2020). To cure illnesses, a large segment of the population, especially in impoverished nations, uses remedies made from higher plants long-standing practice (Manju and Pushpa, 2020). The objective of the study is to assess the antimicrobial activity of the

extracts of rhizome of *Curcuma longa* and *Curcuma amada*

Material and Method

2.1 Plant Collection and Reagents

The plant materials utilized in this investigation were procured from Andhra Pradesh. The plant materials that were recently collected were desiccated in the shade and then milled to produce a coarse powder. Chemicals Mueller Hinton agar (MHA), Tryptic soy agar (TSA), and Potato Dextrose agar (PDA), as well as Mueller Hinton Broth (MHB), Tryptic soy broth (TSB), Potato Dextrose Broth (PDB), Dimethyl sulfoxide (DMSO), cycloheximide, and oxacilin, were acquired from Sigma.

2.3 Microorganisms

This study's microbes came from the Epidemiology Laboratory at India's Institute of Essential Healthcare Sciences in Chennai. The *Staphylococcus aureus* strain MTCC #3163 is one of the gram-negative types of bacteria, whereas a species of, a bacterium and *Escherichia coli*, among others are some of the gram-negative strains. *Fusarium solani* MTCC # 350, *Ceratocystis fimbriata* MTCC # 2281, *Rhizoctonia solani* MTCC # 4634, and *Marcophomina phaseolina* MTCC # 257 are the fungal strains.

2.4 Preparation of the extract for antimicrobial assay

For antimicrobial research, plant compounds were dissolved in 100% dimethylsulfoxide (DMSO). 600 µg/disc was at concentration extracted plants were prepared using acetone and acetonitrile. The percentages of the methanol extracts taken from four chosen plant being 1,200 µg/disc and 800 µg/disc, respectively.

2.5 Antibiotics

The antibiotic susceptibility trial was conducted against standard and clinically isolated microorganisms using four antibiotics. The names and concentrations of the antibiotics and antifungals are as follows: Rifampicin (10 mcg), Ciprofloxacin (10 mcg), and Chloramphenicol (30 mcg)

2.6 Antimicrobial assay

The antimicrobial assay was conducted using the agar disc diffusion method (Dash et al., 2020). The sterile Petri plates (Hi-media) were inoculated with 200 µl of the inoculum (1×10^8 Cfu) and the molten Mueller Hinton Agar (HiMedia). The mean values were determined after the experiment was conducted on three separate occasions. The antimicrobial activity was assessed by measuring the diameter of the zone of inhibition in millimeters.

2. Result and Discussion

Numerous researchers have recently reported the antimicrobial properties of a variety of plant extracts against specific pathogens.

Table 1: “Antibacterial activity of Curcuma longa extracts”

Extract	dose (µg/cup)	“zone of inhibition# (diameter in mm)”				
		E.c	Xa	P.m	S. a	K. p
Hexane	50	-	5	-	-	-
	100	-	5	-	6	5
	250	-	6	6	6	6
	500	-	8	6	6	6
Chloroform	50	5	6	6	7	5
	100	7	6	7	8	6
	250	8	8	8	8	6
	500	8	9	8	8	6
Methanol	50	6	7	7	-	5
	100	7	8	7	-	5
	250	7	9	8	-	6
	500	8	9	8	-	6
Chloramphenicol		27	20	17	25	24
DMSO		-	-	-	-	-

“X. a=Xanthomonas, P.m= P. mirabilis, S. a=Streptococcus aureus; E.c=Escherichia coli, K.p= Klebsiella pneumonia; -No activity. #Values are the average of triplicate; Includes the cup diameter (4mm)”.



Fig. 1 “Chloroform extract of Curcuma longa rhizome produce zone of inhibition at different concentrations against P. mirabilis and Xanthomonas”

Chloroform and methanol rhizome extracts of Curcuma longa in contrast to the standard drug, have demonstrated remarkable antibacterial activity. Compared to that the bacteria are gram-positive, the extracts showed a larger zone of blockage on bacterial species that are gram-negative. There was no observed zone of restriction over any of the tested bacterial species when Curcuma longa was extracted in either hexane or methanol. At all doses tested, the extract

made of chloroform showed the strongest zone of reduction compared to the other extracts. According to Figure 1, the chloroform extract showed the widest range of protection towards *P. mirabilis* and a strain of at a dosage of 500 µg/m. The antibacterial activity results were presented in Table 1.



Fig. 2 “Hexane extract of *Curcuma amada* rhizome produce zone of inhibition at different concentrations against *E. coli*, and *Xanthomonas*”

Table 2: “Antibacterial activity of *Curcuma amada* extracts”

Extract	dose (µg/cup)	“Zone of inhibition# (diameter in mm)”				
		E.c	Xa	P.m	S. a	K. p
Hexane	50	8	8	9	7	9
	100	9	9	9	8	10
	250	9	10	10	8	10
	500	10	11	10	9	10
Chloroform	50	8	6	7	6	-
	100	8	6	7	6	-
	250	8	6	8	6	-
	500	10	8	9	8	-
Methanol	50	10	6	6	6	7
	100	11	6	7	7	7
	250	12	7	7	8	7
	500	13	7	7	10	8
Chloramphenicol		27	20	17	25	24
DMSO		-	-	-	-	-

“X. a=*Xanthomonas*, P.m= *P. mirabilis*, S. a=*Streptococcus aureus*; E.c=*Escherichia coli*, K.p= *Klebsiella pneumonia*; -No activity. #Values are the average of triplicate; Includes the cup diameter (4mm)”.

According to Curcuma armada, root extracts, limit of protection towards gram-negative germs was larger in the extracts compared to those that were gram-positive. A good zone of inhibition was seen at all doses for the hexane extract, which was significant in comparison to the other evaluated extracts. At a dose of 500 µg/m, the extract from hexane showed the widest range of reduction in E. coli and a strain of (Figure 2). Table 2 displays the findings of the antibiotic's activity.

3. Conclusion:

At all doses tested, the extract made of chloroform of Curcuma longa showed the strongest zone of reduction compared to the other extracts. A good zone of inhibition was seen at all doses for the hexane and methanol extract of Curcuma amada, which was significant in comparison to the other evaluated extracts. The usage in traditional treatments dates back to ancient times, and the current study's findings have scientific backing that practice.

4. References

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