ScienSage

Journal of Advanced Scientific Research

Available online through http://www.sciensage.info

ISSN
0976-9595
Short Communication

ANTIMICROBIAL ACTIVITY OF RHIZOME EXTRACTS OF *CURCUMA CAESIA*, *CURCUMA AMADA* AND *CURCUMA ANGUSTIFOLIA*

Mamta Yadav*, Saravanan Kaliyaperumal

Bhagwant University, Ajmer, Rajasthan, India

**Corresponding author: mamtayadavpharma@gmail.com*

ABSTRACT

The present investigation was conducted to examine antimicrobial activity of rhizome extracts of *Curcuma caesia*, *Curcuma amada* and *Curcuma angustifolia*. The antibacterial activity of the methanol extract of *Curcuma caesia*, *Curcuma amada* and choloroform extract of *Curcuma angustifolia* was tested against *Escherichia coli* and *Bacillus subtilis* bacterial strains. Ofloxacin and ciprofloxacin were taken as a standard reference for antibacterial activities. The methanol extracts of *Curcuma caesia* showed the highest antibacterial activity than methanol extract of *Curcuma amada* and chloroform extract of *Curcuma angustifolia*. Dose-dependent inhibition was observed in all the studies.

Keywords: *Curcuma caesia*, *Curcuma amada*, *Curcuma angustifolia,* Antimicrobial activity.

1. INTRODUCTION

Some of the antibiotics have failed to discourage the growth of many bacteria that have genetic ability to resist to particular drugs, and these antibiotics may have the various side effects on human body which can harm to vital organs of body like kidney, liver, pancreas and their impact on the immune system [1]. Plants are rich source of natural products, used to cure various kinds of diseases, as it have a wide variety of secondary metabolites, such as alkaloids, flavonoid, phenols, tannins, terpenoids, phytosterol and steroids. The natural plant materials have served as an important source of pharmaceutical products since time immemorial; the modern medicines for human use are required to meet exacting standards that relate to their efficacy, quality and safety [2].

Curcuma caesia Roxb. (Zingiberaceae) is commonly known as 'Kali haldi'. It is a perennial herb, and in India, it grows in West Bengal, Madhya Pradesh, Orissa, Bihar, and Uttar Pradesh and is used by the tribal people to cure various ailments [3]. The name "black turmeric" holds due to the presence of cells related to black color in the rhizome. The plant is claimed to be useful in treating piles, leprosy, bronchitis, asthma, cancer, and epilepsy. A paste of rhizomes is applied externally for curing wounds, pimples, and allergies [4].

Curcuma amada Roxb. (family Zingiberaceae) is commonly known as 'Amba haldi' or Mango ginger. Is a unique spice having morphological resemblance with ginger but has raw mango. It is widely distributed in the tropics from Asia to Africa and Australia [5]. Mango ginger rhizome has been reputed as an appetizer, alexteric, antipyretic, aphrodisiac, and a laxative. It is also used in itching, skin diseases, bronchitis, asthma, and inflammation due to injuries [4].

Curcuma angustifolia (family Zingiberaceae) is commonly known as 'Tikhur'. The rhizomes of *Curcuma angustifolia* is used as ethnic food and for its medicinal values [6, 7]. It has potential antioxidant, antimicrobial and anticancerous activity towards human cervical cancer HeLa cells [8]. In Madhya Pradesh (India), it used in the treatment of indigestion, skin diseases, cough, bronchitis, allergy, leucoderma and as general tonic, it has also found beneficial in diarrhoea, dysentery and colitis, typhoid fever, ulceration of bowels, bladder and in painful micturation [9]. In the present investigation, antimicrobial activity of rhizome extracts of *Curcuma caesia*, *Curcuma amada* and *Curcuma angustifolia* is tested against various disease causing human pathogenic bacteria to prove its antimicrobial efficiency.

2. MATERIAL AND METHODS

2.1. Material

The following ingredients were used for the preparation of nutrient agar media and Potato dextrose media: Agar, Peptone, Sodium chloride, Beef extract, Potato, dextrose, water. All other chemicals and analytical

reagents were purchased from Hi-media, India. Ofloxacin and Ciprofloxacin was procured as gift sample from park benz laboratories, Bhopal (M.P.)
Rhizome of *Curcuma Caesia, Curcuma Amada* and *Curcuma Angustifolia* were collected from local area of Bhopal (M.P.) in the month of March, 2019. The plant material authenticated by Dr. Jaswinder Mehta, Department of Botany, Career College, Bhopal (M.P.).

2.2. Extraction by maceration process

*Curcuma caesia (*265 gm), *Curcuma amada* (310 gm) and *Curcuma angustifolia* (45 gm) dried rhizome were exhaustively extracted with different solvents (Chloroform, Ethyl acetate Methanol and Water) using maceration method. [5] The extract was evaporated above their boiling points. The extracts were evaporated to dryness by rotary vacuum evaporator and the sample was stored in amber coloured bottle for the further study.

2.3. Antimicrobial activity

The well diffusion method was used to determine the antibacterial activity of the extract prepared from the *Curcuma caesia, Curcuma amada, Curcuma angustifolia* using standard procedure of Bauer *et al* [10]. Antibacterial activity was tested against *Escherichia coli* and *Bacillus subtilis,* was procured from Scan Research Laboratories, Bhopal. Bacterial strains were revived by plating on nutrient agar and Sabouraud dextrose agar, respectively. Isolated colonies were selected after overnight incubation at 37°C. Ofloxacin and ciprofloxacin at 10, 20 and 30 µg/ml concentration was taken as a standard reference for antibacterial activities. The antimicrobial activity of the chloroform and methanol extract was determined. Mueller Hinton agar was the growth medium used for the microbes. The medium was prepared, sterilized at 121°C for 15 minutes and the sterilized medium was poured into sterile Petri dishes. The plates were allowed to cool and solidify. Agar diffusion method was used for screening of the extracts. The sterilized medium was seeded with 0.1 ml of the standard inoculum of the test microorganism; the inoculum was spread evenly over the surface of the medium with a sterile swab. Using a standard cork borer of 6 mm in diameter a well was cut at the center of each inoculated medium. Different extracts (0.1 ml) were poured in three concentrations (25, 50, and 100 mg/ml) in different wells marked as 1, 2, and 3 of the solidified seeded nutrient agar layer in Petri dishes. The petri dishes were incubated at 37°C for 24 h, and zones of inhibition were observed and measured using a scale. The values of zones of inhibition were recorded in triplicate, and the results were reported in mean (±SEM) [10].

3. RESULTS AND DISCUSSION

The antibacterial activity of methanol extracts of *Curcuma caesia, Curcuma amada* and chloroform extract of *Curcuma angustifolia* was studied using the Agar diffusion method, and the results are shown in Table 1. The antibacterial activity of *Curcuma caesia, Curcuma amada* and *Curcuma angustifolia* was performed against *Escherichia coli* and *Bacillus subtilis*. In case of antibacterial activity against *Escherichia coli,* methanolic extract of *Curcuma caesia* was more effective than *Curcuma amada* at all concentrations; whereas, the choloroform extract of *Curcuma angustifolia* was not found effective at all concentrations. The activity increases from methanol extract to chloroform extract with increasing dose. Similar results were observed in case of *Bacillus Subtilis*. On comparing with standard, *Curcuma caesia* was found to be stronger growth inhibitor against both bacterial strains.

Medicinal plants exhibit antimicrobial activity by different mechanisms. This can be achieved by the inhibition of cell wall synthesis, interference with the permeability of cell membrane, cause membrane disruption, modifying cellular constituents, and cell damage or cell mutation [11]. Most of the solvents such as ethanol, hexane, and methanol, when used for plant extract showed inhibitory effect on Gram-positive and Gram-negative bacteria. The present findings shows that possess antimicrobial properties and its rhizome can be exploited as sources of bioactive compounds for medicinal uses.

Table 1: Antimicrobial activity of standard drug against selected microbes

S. N	Name of drug	Microbes	Zone of Inhibition (mm)		
			10 µg/ml	20 µg/ml	30 µg/ml
1	Ofloxacin	*Escherichia coli*	16±0.86	21±0.57	28±0.5
2	Ciprofloxacin	*Bacillus Subtilis*	12±0.5	17±0.74	20±0.15

Table 2: Antimicrobial activity of extract of *Curcuma caesia*, *Curcuma amada* and *Curcuma angustifolia* against selected microbes

Name of microbes	Zone of inhibition (mm)		
	Methanolic extract of *Curcuma caesia*		
	25 mg/ml	50 mg/ml	100 mg/ml
Escherichia coli	9±0.47	12±0.5	13±0.86
Bacillus Subtilis	7±0.94	12±0	14±0.57
	Methanolic extract of *Curcuma amada*		
Escherichia coli	7±0.74	8±0.57	9±0.86
Bacillus Subtilis	10±0.47	12±0.5	14±0.47
	Chloroform extract of *Curcuma angustifolia*		
Escherichia coli	-	-	-
Bacillus Subtilis	6±0	7±0.94	8±0.57

4. CONCLUSION

The rhizome extracts of *Curcuma caesia*, *Curcuma amada* and *Curcuma angustifolia* has potential antibacterial agent as it shows significant activity against bacterial pathogens. The present results will form the basis for selection of *Curcuma caesia*, *Curcuma amada* and *Curcuma angustifolia* for further investigation in the potential discovery of new herbal bioactive compounds. However, further studies are needed to better evaluate the potential effectiveness of the crude extracts.

Conflict of Interests

All Authors have declared no conflict of interest

5. REFERENCES

1. Neamah SR, Qasim MT, Al-Janabi LM, Jaber AS. *European J Pharm Med Res,* 2016; **3(8):** 676-684.
2. Rahumadhunisha BS, Karthikeyan S, Arumugamand S, John A. *Inter J Pharm Scre Meth,* 2014; **4(3):**127-130.
3. Pandey AK, Chowdhury AR. *Flavour Fragr J,* 2003; **18:**463-465.
4. Kirtikar KR, Basu BD. Indian Medicinal Plants. 2nd ed. Dehradun, India: Bishen Singh and Mahendrapal Singh Publishers; 1999.
5. Sasikumar B. *Plant Genet Resour,* 2005; **3:**230-251.
6. Sharma A. *Indian J Trad Know,* 2012; **11(1):**154-155.
7. Devi AD, Singh TC, Devi OI, Singh SS, Singh AR, Singh EJ. *Asian J Pharm Sci Tech,* 2015; **5(1):**50-53.
8. Nayak S, Jena AK, Sucharita S. *World J Pharm Pharm Sci,* 2013; **2(6):**4972-4986.
9. Quamar MF, Bera SK. *Journal of Plant Science & Research,* 2014; **1(1):**101.
10. Achika JI, Ndukwe GI, Ayo RG. *Ind Chem,* 2016; **2:**113.
11. Rao AS, Shobha KL, Almeida PM, Rai KS. *Asian J Pharm Clin Res,* 2017; **10:**52-54.