International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Antimicrobial Activity of Rhizomes of *Curcuma zedoaria* Rosc.

Chachad D. P.[1], Talpade M. B.[2], Jagdale S. P.[3]

[1]Department of Botany, Jai Hind College, Churchgate, Mumbai – 400 020, India

[2]Department of Xoology, S.V.K.M's Mithibai College, Vile-Parle (w), Mumbai – 400 056, India

[3]Principal, Dapoli Urban Senior Science College, Dapoli, Ratnagiri, Maharashtra, India

Abstract: ***Antimicrobial drugs may either kill micro-organisms outright or simply prevent their growth. There are various ways in which these agents exhibit their antimicrobial activity. Staphylococcus aureus causes suppurative (pyogenic or pus forming) conditions, mastitis of women and cows, boils. Streptococcus pyogenes is pathogenic to human and found in sore throat, follicular tonsillitis &septicaemia. Escherichia coliis generally non-pathogenic and is incriminated as pathogen, because in certain instance some strains have been found to produce septicaemia, inflammation of liver and gall bladder.Pseudomonas aeruginosa is related with hospital infections and post burn infections. They also cause infections of middle ear, eyes and urinary tracts.Aspergillusspp. is known to cause aspergillosis infecting external ear, lungs, eyeand brain. Candida causes candidiasis, infecting respiratory, gastrointestinal and urogenital tracts& skin. Plants are rich in a wide variety of secondary metabolites such as tannins, terpenoids, alkaloids, flavonoids, glycosides, etc., which have been found* in vitro *to have antimicrobial properties. It is essential to investigate newer drugs with lesser resistance.Curcuma zedoariaRosc.isused for ailments such as arthritis, colic, cough, asthma, diarrhoea, dysentery, rheumatism, skin disease etc.As the drug claims to have so many medicinal and cosmetic properties, its pharmacological evaluation becomes necessary. For the present study antibacterial, antifungal activities of ethanolic extract were performed using standard methods. Antimicrobial activities were performed using disc diffusion method. The results showed potential antibacterial, antifungal activity.***

Keywords: *Curcuma zedoaria*, Kachore, Antifungal activity, Antibacterial activity

1. Introduction

Antimicrobial drugs interfere chemically with the synthesis of function of vital components of micro-organisms. The differences provide us with selective toxicity of chemotherapeutic agents against microbes. Antibiotics are one of our most important weapons in fighting microbial infections and have greatly benefited the health-related quality of human life since their introduction. However, over the past few decades, these health benefits are under threat as many commonly used antibiotics have become less and less effective against certain illnesses, not only because many of them produce toxic reactions, but also due to emergence of drug-resistant microbes[1].Drugs derived from natural sources play a significant role in the prevention and treatment of human diseases. In developing country like India, traditional medicine is one of the primary healthcare systems. Herbs are widely exploited in the traditional medicine and their curative potentials are well documented.About 61% of new drugs developed between 1981 and 2002 were based on natural products and they have been very successful, especially in the areas of infectious disease and cancer[2]. Recent trends, however, show that the discovery rate of active novel chemical entities is declining. Natural products of higher plants may give a new source of antimicrobial agents with possibly novel mechanisms of action. Plants are rich in a wide variety of secondary metabolites such as tannins, terpenoids, alkaloids, flavonoids, glycosides, etc., which have been found *in vitro* to have antimicrobial properties[1,2].

Herbal medicines have been known to man for centuries. Therapeutic efficacy of many indigenous plants for several disorders has been described by practitioners of traditional medicine. Antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world. The World Health Organization estimates that plant extracts or their active constituents are used as folk medicine in traditional therapies of 80% of the world's population. The harmful microorganisms can be controlled with drugs and these results in the emergence of multiple drug-resistant bacteria and it has created alarming clinical situations in the treatment of infections. The pharmacological industries have produced a number of new antibiotics; resistance to these drugs by microorganisms has increased. In general, bacteria have the genetic ability to transmit and acquire resistance to synthetic drugs which are utilized as therapeutic agents.

*Curcuma zedoaria*Rosc. (Scitaminae – Zingiberaceae) commonly called Kachoreof commerce, is a traditionally used medicine which is described in ancient Ayurvedic literatures for ailments such as arthritis, colic, cough, asthma, diarrhoea, dysentery, rheumatism, skin disease etc[3]. It also is very common ingredient of body deodorants (ubtans), hair oils, face washes etc[4,5]. As the drug claims to have so many medicinal and cosmetic properties, its pharmacological evaluation becomes necessary[6,7].In the present work, an indigenous medicine Kachore of commerce i.e. *Curcuma zedoaria*Rosc.is tested against various disease causing microbes to prove its antibiotic efficiency.

2. Material and Methods

Authentic sample of *Curcuma zedoaria* was collected from Andaman Islands and was authenticated for its botanical identity from BSI (Port Blair). For further evaluation the rhizomes were dried and powdered. One gram of powdered

drug was extracted in 25 ml of ethanol. The concentration used for checking the antimicrobial activity was 40 mg/ml.

Preparation of plates (For anti-fungal activity): Potato dextrose agar (PDA) was sterilized by autoclaving at 15ϕ(lbs) for 20 min and 20 ml of PDA was added to each sterilized petridish (dia. 10 cm). 2 ml of 24 hr culture of different fungal strains were spread on to the respective plates at 40 – 45°C with the help of a spreader and was allowed to set.

Discs of Whatman filter paper no. 1 (dia. 6 mm) were used. The sterile paper discs were thoroughly soaked in alcoholic extracts and were placed on seeded petridish and incubated at 28°C for 72 hours. In each plate one disc soaked in absolute alcohol was kept as control. The antifungal activity was measured in terms of inhibitory zones appearing around the filter paper disc.[8-14]

Preparation of plates (For anti-bacterial activity): The nutrient agar medium was sterilized by autoclaving at 15ϕ (lbs) for 20 min and 20 ml of this medium was added to each sterilized petridish (diameter 10 cm). 2 ml of 24 hr broth culture of following pathogenic bacteria were spread on to the respective plates at 40 – 45°C with the help of a spreader and was allowed to set.

Sterile Whatman filter paper no. 1 discs (diameter 6 mm) were thoroughly soaked in the alcoholic extract and four discs were placed aseptically on each seeded agar plates. In each plate one disc soaked in absolute alcohol was kept as control. The petridishes were then incubated at 37°C for 24 hours.[15-19]

3. Results

Antimicrobial activity of plants can be detected by observing the growth response of various micro-organisms to those plant extracts, which are placed in contact with them.Ethanolic extract of *Curcuma zedoaria* (40mg/ml) was tested against various pathogenic bacteria and fungi. The results obtained are tabulated in Table 1 & Table 2 Antibacterial and antifungal activity was shown by essential oil of *Curcuma zedoaria* on various organisms[14, 15]. Ethanolic extracts showed excellent activity against *S. aureus* and *Trichophytonmentagrophytes.*Ethanolic extracts did not show any activity against *Salmonella paratyphii&Klebsiellapneumonia.*

4. Discussion

*Curcuma zedoaria*Rosc. is a commonly available plant in the *dava- bazaar* as Kachore is a potential anti-microbial agent as it shows significant activity against common bacterial and fungal pathogens.These properties are of great economic value from the cosmetological point of view. The present study justified the claimed uses of rhizomes in the traditional system of medicine to treat various infectious disease caused by the microbes. However, further studies are needed to better evaluate the potential effectiveness of the crude extracts as the antimicrobial agents. The present results will form the basis for selection of plant species for further investigation in the potential discovery of new natural bioactive compounds. Further studies which aimed at the isolation and structure elucidation of antibacterial active constituents from the plant have been initiated.

References

[1] Mukharjee, P. K., Quality control of Herbal drugs – An Approach to evaluation of Botanicals, Pharmaceutical Publishers, 2002.
[2] Prashanth KV, Chauhan NS, Padh H, Rajani M. Search for antibacterial antifungal agents from selected Indian medicinal plants. *J Ethnopharmacol.* 2006;**107**:182–8.
[3] Bhishagratna, K. L., SushrutSamhita (English translation), 1996.
[4] Kirtikar, K. R. and Basu, B. D., Indian Medicinal Plants, Lalit Mohan Basu, Allahabad, Vol. IV, II ed., 2426 – 2427 & 2430 – 2431, reprinted 1975.
[5] Nadkarni, A. K., K. M. Nadkarni's Indian MateriaMedica, Popular book depot, Bombay, III ed, Vol. I, 1996.
[6] Anonymous, Pharmacopoeia of India, Ministry of Health and Family welfare, Govt. of India, Published by Controller of Publications, New Delhi, Vol. II, A- 53, A – 54, 1996.
[7] Anonymous, The wealth of India (Raw material), Publication and information Directorate, CSIR, New Delhi, Vol. IX, 1972.
[8] MounyrB, MoulayS,SaadKI, Methods for in vitro evaluating antimicrobial activity: A review, *Journal of Pharmaceutical Analysis*, 2016,**6**, 71–79.
[9] Marimuthu M M, Aruldass C A, Sandrasagaran U M, Mohamad S, Ramanathan S, Mansor S M, Murugaiyah V., Antimicrobial activity and phytochemical screening of various parts of *Ixoracoccinea*, *Journal of Medicinal Plant Research*, 2014 8 (10), 423 - 429
[10] Rios JL Recio MC, Villar A. Screening methods for natural products with antimicrobial activity: A review of the literature. *J Ethnopharmacol.* 1988; 23:127–49.
[11] Bhalodia NR, Shukla VJ.Antibacterial and antifungal activities from leaf extracts of *Cassia fistula* l.: An ethnomedicinal plant, *J Adv Pharm Technol Res.*2011 **2 (2)**:104-9.
[12] Talpade MB, Chachad DP, Singh A, Bhagwat AM, Anti-microbial activity of *Ixora alba*, *Plumeriaobtusa*and *Psidiumguajava*, *International*

Journal of Microbiology Research, **7(3)**, 2015, pp.-656-663.

[13] Shahidi BH. Evaluation of antimicrobial properties of Iranian medicinal plants against *Micrococcus luteus, Serratiamarcescens, Klebsiella pneumonia and Bordetellabronchoseptica*. *Asian J Plant Sci.* 2004;**3**:82–6.

[14] Banerjee, A. and Nigam, S. S., Antifungal efficacy of the essential oils derived from the various species of the genus *Curcuma* Linn.,*Journal of Research in Indian Medicine, Yoga and Homeopathy*, **13:2**, 1978.

[15] Banerjee, A. and Nigam, S. S., Antibacterial efficacy of the essential oils derived from the various species of the genus *Curcuma* Linn.,*Journal of Research in Indian Medicine, Yoga and Homeopathy*, **12:1**, 1977.

[16] Reddy PS, Jamil K, Madhusudhan P. Antibacterial activity of isolates from Piper longum and Taxusbaccata. *Pharmaceutical Biol.* 2001;**39**: 236–8.

[17] Ramasamy S, Charles MA. Antibacterial effect of volatile components of selected medicinal plants against human pathogens. *Asian J Microbial Biotech Env.* 2009;**6**:209–10.

[18] Alzoreky NS, Nakahara K. Antibacterial activity of extracts from some edible plants commonly consumed in Asia. *Int J Food Microbiol.* 2003;**80**:223–30.

[19] Cheng D, Zhang Y, Gao D, Zhang H, Antibacterial and anti-inflammatory activities of extract and fractions from *Pyrrosiapetiolosa* (Christ etBar.)Ching, *Journal of Ethnopharmacology***155** (2014) 1300–1305.

Table 1: Antifungal activity of *Curcuma zedoaria*

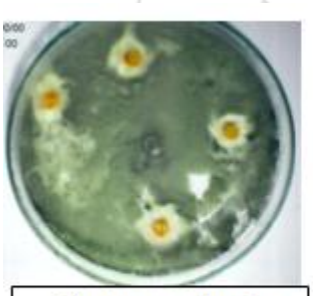
No.	Name of the organism	Zone of inhibition (in mm)*
1	*Aspergillusniger*	11
2	*Aspergillusflavus*	14
3	*Aspergillustamari*	8
4	*Aspergilluspseudoii*	15
5	*Aspergillusfumigatus*	12
6	*Trichodermasps.*	5
7	*penicilliumsps.*	6
8	*Trichophytonmentagrophytes*	16
9	*Trichophytonajoli*	14
10	*Candida albicans*	12

*Zone of inhibition = Diameter of inhibition – diameter of disc

Table 2: Antibacterial activity of *Curcuma zedoaria*

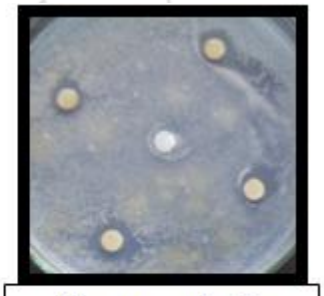
No.	Name of the organism	Zone of inhibition (in mm)*
1	*Eshcherichia coli*	9
2	*Staphylococcus aureus*	16
3	*Staphylococcus albus*	7
4	*Streptococcus pyogenes*	10
5	*Pseudomonas aeruginosa*	5
6	*Salmonella paratyphii A*	nil
7	*Salmonella paratyphii B*	nil
8	*Klebsiellapneumonia*	nil

*Zone of inhibition = Diameter of inhibition – diameter of disc



Curcuma zedoaria against *Aspergillus fumigatus*

Curcuma zedoaria against *Aspergillus tamarii*



Curcuma zedoaria against *Eshcherichia coli*