INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACY AND CHEMISTRY

Available online at www.ijrpc.com

Research Article

COMPARATIVE EVALUATION OF ANTIMICROBIAL ACTIVITIES OF METHANOLIC EXTRACT OF *CURCUMA LONGA* AND *BOSWELLIA SERRATA*

Rajendra CE[1], Harish kumar DH[2], Yeshoda SV[1], Mahaboob Ali Nadaf[1] and Hanumanthraju N[3]

[1]Drugs Testing Laboratory, Drugs Control Department, Bangalore, Karnataka, India.
[2]Vishweshwarapuram Institute of Pharmaceutical Sciences, Bangalore, Karnataka, India.
[3]Government College of Pharmacy, Bangalore, Karnataka, India.

ABSTRACT

Boswellia serrata (gugul) and ***Curcuma longa*** (**Turmeric**) are well known for their anti-microbial activity. In the present study, Oleo gum resin of *Boswellia serrata* and dried rhizome of *Curcuma longa* were extracted with methanol and evaluated its antimicrobial activities using two gram positive organisms (*Bacillus subtilis*, *Staphylococcus aureus*)and two gram negative organisms (*Salmonella typhi, Escherichia coli*). Both the extracts have shown significant antimicrobial activities. The screening of antimicrobial activity performed on methanolic extract of both the drugs were traditionally used as herbs shows that, they are endowed with potentially exploitable antimicrobial activity.

Keywords: *Boswellia serrata, Curcuma longa, Bacillus subtilis, Salmonella typhi, Escherichia coli.*

INTRODUCTION

Turmeric (*Curcuma longa* L) belonging to family *Zingiberaceae* is one of the important spice crops in India and is the largest producer and exporter of turmeric in the world and accounts for more than 50 percent of the world trade[1]. *Curcuma* extracts exhibits the 5-lipoxygenase activity in rat peritoneal neutrophiles as well as the 12-lipoxygenase and cycloxygenase activities in human platelets. In a cell free peroxidation system *curcuma* extracts exerts strong antioxidant activity. Thus its effect on the dioxygenases is probably due to its reducing capacity[2]. *Boswellia serrata* belonging to family *Burseraceae*, occurs in tropical parts of Asia and Africa and the oleo gum resin of the plant is known to possess a variety of activities such as antiarthritic, anti-inflammatory, anti\tumour and anticarcinogenic effects[3]. The oleo gum resin is known to contain monoterpenes, diterpenes and triterpenes. In the ayurvedic system of medicine it is used as a cure for rheumatic arthritis and gout[4].

The present study was undertaken to evaluate the comparative antimicrobial activities of Methanolic extract of *Curcuma longa* and *Boswelli serrata* using two gram positive and two gram negative organisms.

MATERIALS AND METHODS

Plant Materials

Curcuma longa dried rhizomes and *Boswellia serrata* Oleo gum resins were collected from local market Bangalore, in the month of March. These were identified and authenticated by Dr. Jawahar C Raveendran, Bangalore. The rhizomes and oleo gum resin material were washed with water to remove dirt prior to the

drying process. The plant material were cut, air-dried and grounded into powder and then sieved through 80mesh seiver.

Extraction

The powdered *curcuma longa* rhizome and *Boswellia serrata* oleo gum resins were transferred into Soxhlet apparatus separately and were extracted using methanol for 6 hours and the procedure of extraction was repeated 3 times. The extracts were filtered and concentrated to dryness, after which the residue were transferred into pre-weighed sample containers and were stored and later used for antimicrobial activities.

Test Micro-organisms and growth media

The following gram +ve and gram –ve bacteria were used for antimicrobial studies. Bacteria's include *Salmonella typhi, Escherichia coli*, *Bacillus Subtilis* and *Staphylococcus aureus*. The bacterial strains were grown in nutrient agar media at 37^0C. The stock culture was maintained at 4^0C.

Antimicrobial Screening

Screening of antibacterial activity of methanolic extract of both *Curcuma longa* and *Boswellia serrata* were done by using agar diffusion method. Four organisms, two Gram negative *i.e Escherichia coli* (ATCC 1536)*, Salmonella typhi* (ATCC 14028) and two gram *positive i.e. Bacillus Subtilis* (ATCC 6633)*, Staphylococcus aureus* (ATCC 29737) were used in the present study to determine the antibacterial activity of the crude extracts. In disc diffusion method, nutrient media was used as a culture media and the cavities were made aseptically over the bacterial culture on nutrient agar plates using borer and filled with Standards Ciprofloxacin (100µg/disc) and Amoxicillin (100µg/disc) as positive control, *Curcuma longa* rhizome extract (500µg/disc), *Boswellia serrata* oleo gum resin extract (500µg/disc) in Dimethyl formamide (DMF) and only solvent (DMF) as negative control and incubated at 37^0C for 24 hours. After incubation for 24hours, the zone of inhibition around the discs was measured by millimeter scale. The experiment was repeated two times to confirm the reproducible results. The sensitivity of the microorganism species to the plant extracts was determined by measuring the size of inhibitory zones (including the diameter of disc) on the agar surface around the disks. All experiments were performed in duplicate.

Determination of Minimum Inhibitory Concentrations (MIC)

A 16h culture was diluted with a sterile physiological saline solution (0.85% w/v sodium chloride) to achieve an inoculums size of approximately 10^6 colony forming unit ml^{-1}. A serial dilution was carried out to give final concentrations between 0.1 to 1.0mg /0.1ml. The tubes were inoculated with 20µl of the bacterial suspension per ml nutrient broth, homogenized and incubated at 37^oC. The MIC value was determined as the lowest concentration of the crude extract in the broth medium that inhibited the visible growth of the test microorganism.

RESULTS AND DISCUSSION

Existing literature of *Boswellia serrata* and *Curcuma longa* were mainly reported the anti-inflammatory activity, anti arthritic and lowering ulcerogenic index. In this study the methanolic extract of *curcuma longa* rhizome and *Boswellia serrata* oleo gum resin extracts were evaluated for their antimicrobial properties.

Preliminary antimicrobial screening assay of methanolic extract of *Curcuma longa* and *Boswellia serrata* extracts gave relatively wide inhibition zone against the test strains compared with the positive control. The relatively wider spectrum of activity of the methanolic extracts over the positive control is significant from the disk diffusion assay.

The MIC value of methanolic extracts against two gram positive and two gram negative organisms were found to be 500µg.

The inhibition zone of methanolic extract of *Curcuma longa* for *E.coli* (12±0.22mm), *S.typhi* (13±0.16mm), *Bacillus subtilis* (12±0.51mm), *S. aureus* (11±0.24mm) and the inhibition zone of methanolic extract of *Boswellia serrata* for *E.coli* (16±0.42mm), *S. typhi* (15±0.12mm), *B. Subtilis* (16±0.23mm) and for *S. aureus* (13±0.59mm), respectively. In this study both the extract has shown greater antimicrobial activity which may explain anonymous claim on the topical use of *Boswellia serrata* and *Curcuma longa* for microbial infection.

Table 1: The Antimicrobial activities (Zone of Inhibition) of methanolic extract of *Curcuma longa* rhizome and oleo gum resin of *Boswellia serrata* against different organisms

S. No.	Name of the Drug	Dose Loaded (µg/disc)	*E.coli* mm*	*S. typhi* mm*	*B. subtilis* mm*	*S. aureus* mm*
1	Ciprofloxacin	100	48±0.51	36±0.22	32±0.81	3±0.82
2	Amoxicillin	100	12±0.15	12±0.54	12±0.75	12±0.12
3	Boswellia Serrata Extract	500	16±0.42	15±0.12	16±0.23	13±0.59
4	Curcuma longa extract	500	12±0.22	13±0.16	12±0.51	11±0.24

*Data represents an average of four determinations/treatment. Figure in parenthesis represent standard error.

CONCLUSION

In Conclusion, the screening of antimicrobial activity performed on *Boswellia serrata* and *curcuma longa* extracts which were traditionally used as herbs shows that they are endowed with potentially exploitable antimicrobial activity. Hence, *Curcuma longa* and *Boswellia serrata* combinations could be used as an easy accessible source of natural antimicrobial agents. Further purification of the active compounds and in vivo evaluation of antimicrobial activity along with toxicity studies of the extracts from *Boswellia serrata* and *Curcuma longa* are therefore suggested for further studies.

REFERENCES

1. Chaudhay *AS, Sachan SK and Singh RL. Studies on varietal performance of turmeric (Curcuma longa* L). Indian J.Crop Science. 2006;1(1-2): 189-190.
2. Ammon HP, Safayhi H Mack T, Sabieraj J. Mechanism of anti-inflammatory actions of curcumine and boswellic acids. J. Ethanopharmacol. 1993;38 (2-3):113-119.
3. Jyothi Y, Jagadish V Kamath and Mohammed Asad. Effect of Hexane extract of *Boswellia Serrata* oleo gum resin on chemically induced liver damage. Pak. J. Pharm. Sci. 2006;19(2): 25-129.
4. Babita Mahajan S, Taneja C, Sethi VK and Dhar KL. Two Triterpenoids from *Boswellia serrata* Gum resin. Phytochemistry. 1995;39(2):453-455.
5. Shrikhande BK and Goupale DC. Development and evaluation of anti-inflammatory oleogels of *Boswellia serrata* (Gugul) and *Curcuma longa* (Turmeric). Indian Drugs. 2001;38 (12): 613-616.
6. Francesca Borrelli, Francesco Capasso, Raffaele Capasso, Valeria Ascione, Gabriella Aviello, Rocco Longo and Angelo A. Izzo. Effect of *Boswellia Serrata* on intestinal motility in rodents: inhibition of diarrhea without constipation. British Journal of Pharmacology. 2006;148:553-560.