



## ANTIBACTERIAL ACTIVITY OF VOLATILE OIL OF IXORA COCCINIEA AGAINST BURN ISOLATES

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### ABSTRACT

Volatile oils are one of the groups of secondary metabolites produced by some plants. Their probable users against burn microbes have received little attention. Burn swabs obtained from ten burned patients at Government hospital, led to the isolation of bacteria using standard methods, the microorganisms were isolated. Then chloroform, methanol and aqueous extract of volatile of *Ixora Coccinea* against *S.aureus*, *E.coli*, *Pseudomonas aeruginosa*, *P.vulgaris* and *K.pneumoniae* exhibited antibacterial were found efficacious respectively.

**Key words:** Burn; antibacterial; volatile oil; metabolites.



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## INTRODUCTION

One of the survey conducted by the WHO report that more than 80% of the world's population still depends upon the traditional medicine for various diseases (Priya *et al.*, 2002). Essential or volatile oil of plants have been variously reported to have medicinal applications. Medicinally they are used in aroma therapy, as insect repellents, larvicidal and insecticidal agents (Aisien *et al.*, 2004). Many bacteria have been implicated in different burn ailments and disease conditions. Quite a number of synthetic antibacterial agents are known to be of use in reducing the population of the non-desirable burn microbes although to varying degrees of success. There is need to explore natural herbs with probable antimicrobial potential against dangerous burn microbes (Colombo and Bosisio, 1996). The present study was aimed at examine the probable antibacterial effects volatile oil of *Ixora Coccinea* could show against burn isolates.

## MATERIALS AND METHODS

### Collection of plants and extraction of volatile oil

*Ixora Coccinea* leaves were collected from cultivated sources in village sides, Orathanadu, Tamilnadu. The volatile oil of plant was extracted by distillation method using Clevenger type apparatus for 4 hours (African Pharmacopoeia 1986) and the volatile oil was obtained.

### Isolation of burn isolates

Burn swab were obtained at burnt unit of burnt patients from Government hospital, Thanjavur, Tamilnadu. Sterile swabs were used to collect the burn samples. Serial dilution of 10<sup>-5</sup> of 1ml of the mixture was introduced in to a sterile petridish using the pour plate method in to cool molten nutrient agar which had been fortified with 1% starch. The pour plate was incubated at 37°C for 24 hours. Different bacterial strains obtained as typical colonies were sub-cultured and there after purified several times on fresh nutrient agar plates. The isolated pure strains were screened for the antibacterial activity.

### Assay of antibacterial activity

Antibacterial activity was tested by the disc diffusion method (Okoli and Iroegbu, 2004). A 0.2 ml of volume of the standard inoculums (10<sup>6</sup>-10<sup>7</sup> CFU) of the test bacterial strain was spread on Muller Hinton Agar (MHA) with a sterile bent glass rod spreader and allowed to dry. Then, 6mm-diameter wells were bored using cork bores in the MHA. Plant extracts of volatile oil were introduced into each well and allowed to stand for 1 hour at room temperature to diffuse the plants extracts into medium before incubation at 37°C for 24 hours. The incubation zone diameter was measured by antibiotic zone reader to nearest mm.

### Determination of Minimum Inhibitory Concentration (MIC)

The MIC was determined for the antibacterial most efficient extracts, using the cylinder agar diffusion method as described by (Fyhrquist *et al.*, 2002).

## RESULT AND DISCUSSION

From the burnt patients examined in this work, five different organisms were obtained. Based on the colonial appearance, morphological characteristics coupled with appropriate biochemical characteristics like catalase, coagulase, oxidase, citrate, indole and motility tests (Cheesborough, 1984), the five different bacterial isolates were identified as *E.coli*, *Proteus vulgaris*, *K.pneumonia*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*.

The topical application of this plant at the burnt produced significant healing activity which may be due to antibacterial activity of the chemical constituents present in the crude extract. Delays in healing process directly promote the microbial infection. Although the report of the studied plants for the treatment of burn infections is available in literature, found contradictory and equivocal reports on screening of their extracts against pathogens. Similar result of extracts of *A.nilotica* was found as effective growth controller of *E.coli* and *P.aeruginosa*. Depending upon the polarity of solvent, extract yields were found increasing as polarity increased. More yields were found in water extracts of plant volatile oil followed by chloroform. Least yield was found in methanol extract (Table-1).

Antibacterial activity by disc diffusion method exhibit that the strong inhibition of growth of *Staphylococcus aureus* was observed in volatile oil of *Ixora Coccinea*. Moderate type antibacterial activity was observed in *P.vulgaris*, *P.aeruginosa* and *K.pneumonia*. The least inhibition was determined at *E.coli* of volatile oil of plant extracts (Musmeci *et al.*, 2003).

Volatile oils constitute a group of plant secondary metabolites which can best be obtained (from the plant organs containing them) through hydro distillation. This method produces the volatile oils in their original form without being mixed with any other groups of secondary metabolites. The MIC values for the volatile oil of *Ixora Coccinea* were shown in table-2. Among the five burnt bacterial isolates, the MIC of volatile oil of *Ixora Coccinea* observed at *E.coli* by the minimum zone of inhibition (Wongkham *et al.*, 2001).

The results of present study indicate that plant extracts showing positive microbial activity provide the scientific base to include the traditional practices in modern system of medicines. They may, therefore, provide new leads in the development of new antimicrobial drugs for the therapy of diarrhea and other infectious diseases caused by *E.coli*, *S.aureus* or *P.aeruginosa*. It would be helpful in carrying out bioassay-oriented fractionation of the active extracts to isolate best fraction and/or pure compound having antibiotic activities against burnt pathogens (Steenkamp *et al.*, 2004).



## CONCLUSION

The overall results provide the evidences that the volatile oil of the plant have potent antimicrobial effects against some of the burnt pathogens. The study concludes that the plants are a reserve of biologically active substances. Volatile oils can be a significant source of a great diversity of chemical species equipped with antimicrobial capacity, the oil *Ixora Coccinea* can have application in therapy of the burn infectious diseases is like substituents of certain antibiotics or like complementary agents used in synergy with the synthesis substances.

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**Table-1: Antibacterial activity of *Ixora Coccinea* volatile oil against burn isolates by disc diffusion method**

Burn isolates	Zone of inhibition (mm diameter $\pm$ SD)		
	Aqueous extract	Methanolic extract	Chloroform extract
<i>E.coli</i>	3.7 $\pm$ 0.06	1.07 $\pm$ 0.7	2.3 $\pm$ 0.06
<i>P. aeruginosa</i>	5.5 $\pm$ 0.15	2.85 $\pm$ 0.85	4.28 $\pm$ 0.18
<i>K.pneumonia</i>	7.5 $\pm$ 0.41	5.21 $\pm$ 0.04	6.25 $\pm$ 0.18
<i>Proteus vulgaris</i>	4.64 $\pm$ 0.39	2.42 $\pm$ 0.82	3.42 $\pm$ 0.85
<i>S. aureus</i>	9.57 $\pm$ 0.15	5.35 $\pm$ 0.33	7.35 $\pm$ 0.16

**Table-2: MIC of Volatile oil against burns isolates**

Burn isolates	Zone of inhibition (mm diameter $\pm$ SD)		
	Aqueous extract	Methanolic extract	Chloroform extract
<i>E.coli</i>	08	11	10
<i>P. aeruginosa</i>	14	16	15
<i>K.pneumonia</i>	18	15	12
<i>Proteus vulgaris</i>	12	20	18
<i>S. aureus</i>	10	25	11