

ANTIBACTERIAL ACTIVITIES OF *COCCINIA GRANDIS* L.

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Abstract

In vitro antibacterial activity of leaves and stem extracts of *Coccinia grandis* L., has been investigated against *Bacillus cereus*, *Corynebacterium diphtheriae*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli* (ETEC), *Klebsiella pneumonia*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Shigella boydii*. Water extract of leaves and ethanolic extract of stem showed significant activity against *Shigella boydii* and *Pseudomonas aeruginosa* respectively.

Introduction

Coccinia grandis L., of the family Cucurbitaceae is distributed in tropical Asia, Africa and is commonly found in Pakistan, India and Srilanka (Cooke, 1903; Sastri, 1950). *Coccinia* is a climber and trailer (Nasir & Ali, 1973). The fruit of *Coccinia grandis* is used as vegetable when green and eaten fresh when ripened into bright scarlet colour (Sastri, 1950). Every part of this plant is valuable in medicine and various preparations have been mentioned in indigenous system of medicine for various skin diseases, bronchial catarrh, bronchitis and Unani systems of medicine for ring worm, psoriasis, small pox, scabies (Perry, 1980) and other itchy skin eruptions and ulcers (Behl *et al.*, 1993). Oil of this plant is used as an injection into chronic sinuses. The plant is used in decoction for gonorrhoeae (Nadkarni, 1976), diabetes and also useful in dropsical condition, pyelitis, cystitis, strangury, snake bite, urinary gravel and calculi (Jayaweera, 1980; Nadkarni, 1976). It is also useful to induce perspiration in fever and cures sores in the tongue (Anon., 1992). It has antilithic (Jayaweera, 1980), hypolipidimic (Presanna Kumar *et al.*, 1997), antimutagenic (Kusamran *et al.*, 1998) and hypoglycemic activities (Chopra & Bose, 1925; Gupta, 1963; Brahmachari *et al.*, 1963; Mukerjee *et al.*, 1972; Kumar *et al.*, 1997; Nahar *et al.*, 1998). The present study was undertaken to evaluate antibacterial activity of *Coccinia grandis* extracts.

Material and Methods

Plant material: *Coccinia grandis*, leaves and stem were procured from Lasbela (Baluchistan) during the month of July–August 2000. The material was botanically identified and confirmed from Department of Botany, Karachi University, Karachi. Stems and leaves were separated and dried under shade and powdered. The powdered leaves were extracted with boiled water and hexane using rotary evaporator. The extracts were dried in lypholizer and vacuum respectively.

Table 1. Antibacterial activity of leaves and stem extracts of *Coccinia grandis*.

Bacterial cultures	Leaf		Stem				References drugs	
	Water extract	Hexane extract	Water fraction	Hexane extract	Ethyl acetate extract	Ethanol extract	Ampicillin	Amoxicillin
Gram positive								
Zone of inhibition in millimeters								
1. <i>Bacillus cereus</i>	-	-	-	-	6	5.5	9	9
2. <i>Corynebacterium diphtheria</i>	-	5.5	-	-	6	7	11	10
3. <i>Staphylococcus aureus</i>	-	6+	-	-	-	5.5	10	10.5
4. <i>Staphylococcus pyogenes</i>	-	5.5	-	7	6	5.5	9	8
Gram negative								
Gram negative								
5. <i>Salmonella typhi</i>	6	8	-	7	7	6.5	9.5	11
6. <i>Echeriachia coli</i> (ETEC)	-	6	-	6	6	6	10	11
7. <i>Klebsiella pneumoniae</i>	5.5	6	-	6	6	-	10	10.5
8. <i>Pseudomonas aeruginosa</i>	7	8	-	7	7	9	9	12
9. <i>Proteus mirabilis</i>	-	-	-	-	-	-	9+	9
10. <i>Shigella boydii</i>	11	5.5	7	6.5	6	6	11	11

Key = - = No activity

Concentration = 200 µg / 100 µl of DMSO

Size of well = 5 mm (radius)

+ = Decrease in Bacterial population/unit area only

C.F.U / ml = $10^4 - 10^6$

The stem powder were extracted with hexane and ethanol by means of rotary evaporator and concentrated to dryness in vacuum. The partitioning of ethanolic extract was first done with ethyl acetate and water. Ethyl acetate was evaporated and dried by means of rotary evaporator under reduced pressure while water fraction was dried by means of lypholizer. The extracts and fractions were taken for assays.

All the bacterial cultures and medias were obtained from the Microbiology Department, Faculty of Science, University of Karachi.

Antibacterial study: The antibacterial activity was carried out by well-diffusion technique. Ampicillin and Amoxicillin were used as standard and nutrient agar was employed as medium. The *In vitro* screening of antibacterial activity was carried out against gram positive (*Bacillus cereus*, *Corynebacterium diptheriae*, *Staphylococcus aureus* and *Streptococcus pyogene*) and gram negative (*Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Shigella boydii*). The nutrient agar plates were inoculated with 18-24 hrs old bacterial culture having approximately $10^4 - 10^6$ colony forming unit (CFU/ml). Wells were dug in the media and test samples were taken in different concentration in DMSO (Merck) in their respective well. Other wells were supplemented with reference drugs. Size of the drug was of 5 mm radius. The plates were incubated at 37°C for 24 hrs. The zone of inhibition of bacterial growth was measured and compared with the control. Each experiment were repeated three times and their mean diameter of zone of inhibition was recorded (Ovais *et al.*, 2005).

Results and Discussion

Water extracts of leaves and ethanol extract of stem showed high activity against *Shigella boydii* and *Pseudomonas aeruginosa* respectively which is equivalent to the reference drugs (Table 1).

Water extract of leaves showed moderate activity against *Salmonella typhi*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*, whereas hexane extract of leaves were moderately active against all gram positive and negative bacteria except *Proteus mirabilis* which showed no activity. Water fraction of *Coccinia grandis* stem showed activity against *Shigella boydii* only whereas hexane extract was moderately active against *Streptococcus pyogenes*, *Salmonella typhi*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Shigella boydii*. Ethyl Acetate fraction of stem also showed moderate activities against all bacteria except *Staphylococcus aureus*, *Proteus mirabilis* and ethanol extract showed good activity against all organisms except *Klebsiella pneumoniae* and *Proteus mirabilis*.

There does not appear to be any previous report on the antibacterial activity of *Coccinia grandis*.

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