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Potential of Antibacterial and Brine Shrimp Lethality Activities of culinary herb of *Coriandrum sativum* (L.)

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Abstract

Coriandrum sativum (L.) belongs to the family Apiaceae, which is among the most widely used medicinal plant, possessing nutritional as well as medicinal properties. The aim of the present study was to evaluate the antimicrobial and brine shrimp activity of coriander Coriandrum sativum (L.) seeds. The seed extract of *Coriandrum sativum* (L.) using evaluated for antimicrobial activity active against selected strains of *Bacillus cereus, Escherichia coli* and *Pseudomonas aeruginosa* and *Staphylococcus aureus* was investigated by the using agar diffusion method and brine shrimp lethal activity. The conclusion of the present study was observed that the extract of Coriandrum sativum (L.) seeds possesses promising antimicrobial activity against *Staphylococcus aureus, Bacillus cereus, Escherichia coli* and *Pseudomonas aeruginosa* and good results of brine shrimp lethality activity was observed.

Keywords: *Coriandrum sativum* (L.).; seeds; Antibacterial activity; extracts; active principles

1. INTRODUCTION

Culinary herb of Coriander is a small herb, which is belonging to the Apiaceae family. The whole plants of *Coriandrum sativum* (L) are used in cooking and medicinal purposes. The whole plants of C. sativum has been used in the an anti-inflammatory, analgesic, and antibacterial activities are reported [1]. Previously, the active components of volatile oils, flavonoids, and isocoumarins are the main constituents of *C. sativum*. 2-decenoic acid, E-11-tetradecenoic acid, and capric acid were identified as the major components for C. sativum leaves essential oil [1]. The active constituents of linalool was identified as the major constituent of the essential oil of seeds[2]. Iqbal et al. reported that volatile essential oil of coriander seeds possesses alcoholic monoterpenes as main constituent with bioactive potential that can be exploited for different purposes [3]. The aim of the present study was evaluated the antibacterial and brine shrimp lethality activity of *C. sativum* seeds.

2 MATERIALS AND METHODS

2.1 Plant materials

The plant materials of *C. sativum* were purchased from local vegetable market, Tirunelveli, Tamilnadu.

2.2 Preparation of Extracts

The plant materials of seeds of *C. sativum* were dried and powdered. 50 g of the powdered of C. sativum seed was weighed out and submerged in 250 ml 70% ethanol and left to macerate for 72h with occasional shaking. After maceration the resultant mixture was filtered using Whatman filter paper (No.1) and the filtrates evaporated to complete dryness using a water bath at 50^0C [4]. The resulting dry extracts were then weighed to determine the percentage yield for each product. Aliquot portions of the extracts were weighed and dissolved in distilled water for use in the study.

2.3 Antimicrobial screening

2.3.1 Tested strains

The selected bacterial strains of *Bacillus cereus, Escherichia coli, Pseudomonas aeruginosa* and *Staphylococcus aureus* was investigated.

2.3.2 Method

The antibacterial activity of crude extract was tested by the paper disc diffusion method described [4-5]. The pure cultures of four bacterial strains were used and maintained on the nutrient agar medium. The sterile Whatman filter paper 6.0 mm filter paper discs were impregnated with 100µg of each of the sterile test substances and dried to evaporate the residual solvent (ethanol). Standard kanamycin discs (30 µg/

disc) were used as positive control to ensure the activity of standard antibiotic against the test bacteria. The sample discs, the standard antibiotic discs, and dried blank disc impregnated with ethanol (negative control) was placed gently on the previously marked zones in the agar plates pre-inoculated with the test bacteria. The plates were then kept in a refrigerator at 4°C for about 24h upside down to allow sufficient diffusion of the materials from the discs to the surrounding agar medium. The plates were then inverted and kept in an incubator at 37°C for 24h. The result of the antibacterial activity of the test agents was measured by their activity to prevent the growth of the tested bacteria surrounding the discs which gave clear, distinct zone of inhibition. The antibacterial activity of the test agents was determined by measuring the diameter of the zone of inhibition expressed in mm [5-6].

2.4 Brine shrimp lethality activity

2.4.1 Hatching the brine shrimp

Brine shrimp eggs were hatched in artificial sea water prepared from commercial sea salt 40g/1r and supplemented with 6mg/1lr dried yeast. The two unequal compartments plastic chamber with several holes on the divider was used for hatching. The eggs were sprinkled into the larger compartment which was darken, while the smaller compartment was illuminated. After 48 hours incubation at room temperature (25-29°C), nauplii (larvae) were collected by pipette from the lighted side whereas their shells were left in another side.

2.4.2 Bioassay

BSLT was modified from the assay described by Solis et al.[7]. Ten milligrams of the extracts were made up to 2 mg/ml in artificial sea water except for water insoluble compounds which were dissolved in DMSO 50µl prior to adding sea water. Serial dilutions were made in the wells of 96-well microplates in triplicate in 120 µl sea water. Control wells with DMSO were included in each experiment. A suspension of nauplii containing 10-15 organisms (100 µl) was added to each well. The plates were covered and incubated at room temperature (25-29°C) for 24h. Plates were then examined under the microscope and the numbers of dead (non-motile) nauplii in each well were counted. One hundred microlitrs of methanol were then added to each well to immobilize the nauplii and after 15 minutes the total numbers of brine shrimp in each well were counted. Analysis of the data was performed by probit analysis on a Finney computer program to determine the lethal concentration to half of the test organisms (LC_{50}).

3 RESULTS AND DISCUSSION

3.1 Antibacterial activity

Culinary plants of *C. sativum* are traditionally used worldwide as remedies for the treatment of several diseases such as fever, head ache, nostril problem and throat infection. In the present study was observed that ethanol extract of *C. sativum* seed was active against four bacteria such as *Staphylococcus aureus, Bacillus cereus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The maximum activity of ethanolic extract of seeds of *C. sativum* was observed that *Staphylococcus aureus* and minimum level active against *Escherichia coli* (Table-1). Previous study, The crude extract of *Arisaema flavum, Debregeasia salicifolia, Carissa opaca, Pistacia integerrima*, and *Aesculus indica* was observed that high level of active against *Staphylococcus aureus* [8]. Similar results was observed that antibacterial potential of twenty-four plants such as *Justicia zelanica, Phyllanthus urinaria, Thevetia nerifolia, Acacia leucophloea, Solanum surattense, Tephrosia purpurea, Jatropha gossypifolia, Pithecolobium dulce, Holoptelea integrifolia, Lantana camara, Saraca asoca, Tamarindus indica, Aegle marmelos, Acacia nilotica, Woodfordia fruticosa, Mangifera indica, Phyllanthus emblica, Chlorophytum borivilianum, Chlorophytum laxum, Chlorophytum tuberosum, Abutilon indicum, Bombax ceiba, Calotropis procera and Bacopa monnieri* active against the three bacterial strains of *E. coli, P. aeruginosa* and *S. aureus* [9].

Table- 1: Antibacterial activity of culinary plant of ethanolic extract of *C. sativum* seeds

Sl.No.	Concentration of Extract	Zone of the Inhibition (mm)			
		Bacillus cereus	*Escherichia coli*	*Pseudomonas aeruginosa*	*Staphylococcus aureus*
1	100ug/disc	17	13	19	21

3.2 Brine shrimp lethality activity

In the present study was observed that LC_{50} values of *C. sativum* seeds active against the brine shrimp lethality bioassay obtained in the results presented in table-2,3,& 4 and Fig.1. In this extract of *C. sativum* seeds exhibited in the significant toxicity towards brine shrimps. Previously, observed that similar results of several medicinal plants such as *Xanthium indicum, Enhydra fluctuans, Ipomoea aquatica, Chenopodium album, Alternanthera sessilis, Portulaca grandifolia and Lagenaria siceraria* [10]. Several medicinal plants of *Azedirachta indica*, *Azedirachta indica* var. siamensis, *Melia azedarach*, *Sandoricum indicum* and *Swietenia macrophylla* were tested previously[11]. The conclusion of the present study was reported that good

antibacterial and brine shrimp lethal activities of observed in the seeds of *C. sativum*. Further studies, isolation of the active principles present in the seed extract of C. sativum and may be lead to the discovery of new antibacterial and cytotoxic compounds.

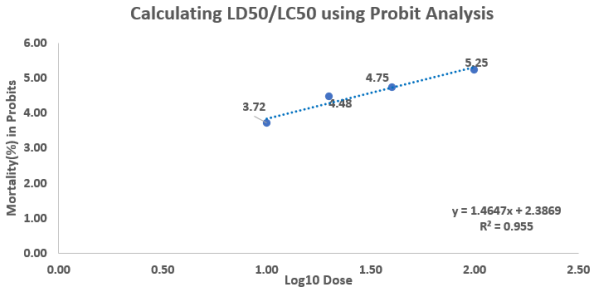

Table-2: Log dose concentration of Brine shrimp lethal toxicity activity of *C. sativum* seeds

Dose/Conc.	Total	Dead	Log Dose
0.00	10	0	
10.00	10	1	1.000
20.00	10	3	1.301
40.00	10	4	1.602
100.00	10	6	2.000

Table-3: Calculating LD50/LC50 using Probit Analysis

Group	Log10 Dose	Empirical Probits
2	1.00	3.72
3	1.30	4.48
4	1.60	4.75
5	2.00	5.25

Table-4:

CURVE_FITTING	
Slope	1.465
Intercept	2.387
SD (σ)	0.683
SE	0.147
R^2	0.955
Chi-test (χ2) Sig	0.921
df	2
Chi-Test	NON-SIG
Fitting	GOOD FIT

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