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Preliminary studies on phytochemicals and antimicrobial activity of solvent extracts of *Coriandrum sativum* L. roots (Coriander)

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ABSTRACT

The ethanol extraction of roots of the fresh *Coriandrum Sativum* were screened for the presence of various phytochemicals by standard procedures. The present study indicates that the fresh roots contain alkaloids, flavonoids, terpenoids, sterols, carbohydrates, saponins and phenolic compounds. The ethanol extract of roots was found to exhibit *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella typhi*, *Klebsiella* and *Candida*. The extract and fractionates of fresh roots of *Coriandrum sativum* showed a significant and remarkable activity against *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella typhi*, *Klebsiella*, when compared to standard. The present work shows the presence of these biologically active chemical in *Coriandrum Sativum* may justify their wide usage in traditional medicine.

Keywords: Phytochemicals, *Coriandrum Sativum* root, Ethanol extract, Antimicrobial activity, *Salmonella typhi*, Bioactive compounds.

1. Introduction

Plants have formed the basis of sophisticated traditional medicine systems that have been in existence for thousands of years – such extensive dependence of human being on “Mother Nature” has invoked tremendous interest in the scientific world, which ultimately led to the isolation of a vast number of chemical agents with potentials for multipurpose uses. Plants have economic and environmental uses, depending on the natural characteristics. Some are consumed in human diet, while other species have medicinal values and still other species are good resource of minerals and vitamins.

Coriandrum Sativum L. is native to regions spanning from southern Europe and North Africa to southwestern Asia. It is a soft plant growing to 50 cm (20 in) tall. The leaves are variable in shape, broadly lobed at the base of the plant, and slender and feathery higher on the flowering stems. The flowers are borne in small umbels, white or very pale pink, asymmetrical, with the petals pointing away from the centre of the umbel longer (5–6 mm) than those pointing toward it (only 1–3 mm long). The fruit is a globular, dry schizocarp 3–5 mm (0.12–0.20 in) in diameter. Although sometimes eaten alone, the seeds often are used as a spice or an added ingredient in other foods.

The word “phyto” is the Greek word for plant. Phytochemicals which not only that they are non nutritive plants chemicals they have protective or disease preventive properties but also protect human from a host of disease. Phytochemical studies have shown that plants with antimicrobial activity contain bioactive constituents such as tannins, flavonoids, alkaloids and saponins. Alkaloids and flavonoids have been used as antiviral, antibacterial, antimicrobial and anticancer agents. Phenolic and polyphenolic are the other group of secondary metabolites. The uses of plant – derived products as disease control agents have been studied, since they tend to have low mammalian toxicity, less environmental effects and wide public acceptance. Hence the present paper reports the phytochemical and antimicrobial activity of *Coriander sativum* Linn roots.

2. Materials and methods

2.1. Plant Collection

The Plants of *Coriandrum Sativum* were purchased from Local market, Aruppukottai, Virudhunagar District, Tamil Nadu. The roots are collected from that plants and they were washed to remove soil particles and impurities by using distilled water. The roots were dried for 24 hours under low sun intensity, and they were stored in polythene bag to be used as samples for the extraction.

2.2. Preparation of Root Extraction

50 g of the *Coriandrum sativum* root was extracted with 250 ml of Ethanol in a round bottom flask using reflux condenser apparatus. The reaction was carried out for 24 hours and the extract was collected the excess ethanol was removed by using a distillation process, the work was carried out at the Department of Chemistry, SBK College, Aruppukottai, Tamil Nadu. (Lalitha, 2012).

2.3. Procedure for the Phytochemicals Test

Phytochemical screening for flavonoids, terpenoids, quinones, anthocyanin, sterols, phenols, carbohydrates, tannins, lactones and saponins were carried out as described below (Lalitha, 2012; Ejoba Raphael, 2012) and the values were tabulated in table 1.

2.3.1. Test for alkaloids:

2.3.1.1. Wagner's Test:

2 ml of extract was treated with wagner's reagent (Iodine and Potassium iodide in 100 ml water) and formation of reddish brown precipitate indicates of the presence of alkaloids.

2.3.2. Test for flavonoids

2.3.2.1. NaOH Test

2 ml of extract was treated with few drops of aqueous NaOH and HCl and formation of yellow orange colour indicates of the presence of flavonoids.

2.3.2.2. H₂SO₄ Test

A fraction of extract is treated with Conc. H₂SO₄ and observed for the formation of orange colour indicates of the presence of flavonoids.

2.3.2.3. Lead Acetate Test

A small amount of extract was treated with lead acetate and observed the formation of white precipitate indicates of the presence of flavonoids.

2.3.3. Test for tannins

2.3.3.1. Ferric Chloride Test

Few ml of extract was added with alcohol and treated with neutral ferric chloride solution and observed for formation of blue or greenish colour solution indicates of the presence of tannins.

2.3.4. Test for saponins

2.3.4.1. Foam Test

A small amount of extract was shaken vigorously with water and the formation of persistent foam indicates of the presence of saponins.

2.3.5. Test for quinones

A small amount of the extract was treated with Conc. HCl and the observed for the formation of yellow colour precipitate indicates of the presence of quinones.

2.3.6. Test for carbohydrates

2.3.6.1. Molisch's Test

Few drops of molisch's reagent is added to each of the portion dissolved in distilled water, this was then followed by addition of 1 ml of Conc. H₂SO₄ by the side of the test tube. The mixture was then allowed to stand for two minutes and then diluted with 5ml of distilled water. Formation of red or dull violet colour at there was interphase of the two layers was a positive test indicates of the presence of carbohydrates.

2.3.6.2. Fehling's Test

About 1ml of each extract was dissolved in distilled water and filtered. The filtrate was heated with 5 ml of equal volumes of fehling's solution A and B. Formation of red precipitate of cuprous oxide, indicates of the presence of reducing sugar which shows the presence of carbohydrates.

2.3.7. Test for terpenoids

2.3.7.1. Liebermann – Burchard Test

1ml of extract was treated with chloroform, acetic anhydride and few drops of H₂SO₄ was added and observed the formation of dark green colour indicates of the presence of terpenoids.

2.3.8. Test for sterols

2.3.8.1. Liebermann – Burchard Test

1ml of extract was treated with chloroform, acetic anhydride and few drops of H₂SO₄ was added and observed the formation of dark pink or red colour or reddish brown ring indicates of the presence of sterols.

2.3.8.2. H₂SO₄ Test

1ml of extract was treated with ethanol and H₂SO₄ and observed the formation of violet or green colour indicates of the presence of sterols.

2.3.9. Test for phenols

2.3.9.1. Liebermann Test

1ml of extract was heated with NaNO₃, H₂SO₄ and diluted with water and then add excess of dilute NaOH and observed the formation of deep red or green or blue colour indicates of the presence of phenols.

2.3.10. Test for anthocyanin

2.3.10.1. NaOH Test

2 ml of extract is treated with 2 M NaOH and observed the formation of blue green colour indicates of the presence of anthocyanin.

2.4. Antimicrobial Activity

The antimicrobial assay was carried out using Agar well diffusion method. Amikacin (30 µg/ml) are used as reference drug and corresponding solvent (Ethanol) is used as positive controls. About 20 ml of Muller – Hinton agar medium for bacteria and potato dextrose agar for fungus was poured sterilized Petri dishes and allow to solidify. The agar medium was spread was 24 hrs cultured 108 CFU/ml microbial sterilized rod. Wells of 6 mm diameter were made in the culture medium using sterile cork borers. About 30 µl and 50 µl of the plant extracts (1 µg/ml) was added the wells. Plates were than incubated at 37 °C for 24 h. Antimicrobial activity was evaluated by measuring the inhibition zone diameters in mm formed around the well. The assay was carried out in triplicates and the results thus obtained is taken as the mean of the three readings for each concentration and no statistical tools were

used calculate the standard deviation the work was carried out at the Bose Laboratory, Madurai, Tamil Nadu. The Antimicrobial activity of *Coriandrum sativum* L. root ethanol extract against bacteria pathogens with reference to Amikacin is reported in table and also represented as bar diagram 1.

3. Results and Discussion

Phytochemical screening suggests that ethanolic extract various constituents which are given in the table 1. The preliminary phytochemical test indicates the presence of alkaloids, flavonoids, saponins, carbohydrates, terpenoids and phenolic compounds and

the absence of tannins and quinines. The presence of wide range of phytochemical constituents indicates that the plant could be used in a multitude of ways which may be beneficiary to the population. An important part of natural products from plants, biomolecule and secondary metabolites usually exhibits some kind of biological activities. They are widely used in the human therapy, veterinary, agricultures and scientific research and in countless other areas. The usefulness of plant materials medicinally is due to the presence of bioactive constituents such as alkaloids, flavonoids, sterols, carbohydrates and phenolic compounds.

Table 1: Preliminary qualitative Phytochemical analysis of root of *Coriandrum sativum* L.

Compound Test & Reagents		Ethanol Extract
Alkaloids	Wagner's Reagent	+
Flavonoid	NaOH Test	-
	H ₂ SO ₄ Test	+
	Lead Acetate Test	+
Tannins	Ferric Chloride Test	-
Saponins	Foam Test	+
Quinones		-
Carbohydrates	Molisch's Test	+
	Fehling's Test	+
Terpenoids	Liebermann - Burchard Test	+
Sterols	Liebermann – Burchard Test	+
	H ₂ SO ₄ Test	+
Phenols	Liebermann Test	+
Anthocyanines	NaOH Test	-

Table 2: Antimicrobial activity of *Coriandrum Sativum* L. root ethanol extract against bacteria pathogens with reference to Amikacin

Compound	Weight of the compound (µg/ml)	Zone of inhibition (in mm)				
		<i>Salmonella typhi</i>	<i>Staphylococcus aureus</i>	<i>Bacillus cereus</i>	<i>Klebsiella</i>	<i>Candida (Fungus)</i>
Amikacin (Standard)	30	17	18	20	17	17
<i>Coriandrum Sativum</i> L. root	50	11	15	19	20	R

R=Resistant (No Activity)

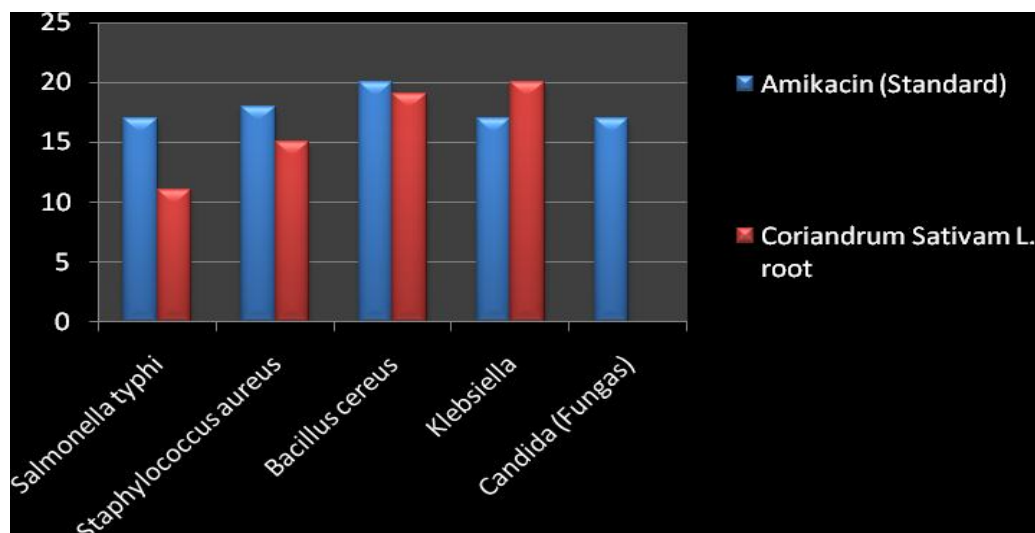


Diagram 1: Comparison of Antimicrobial activity of *Coriandrum Sativum* L. root and Standard Amikacin

The antimicrobial studies given in table 2 and shown in figure 1 to 5 reveals that the good antibacterial potential of the ethanol extracts of *Coriander sativum* root. The result of phytochemical screening

indicate that the plant extracts contain alkaloids and flavonoids. The antimicrobial activity of the extracts might be attributed to the presence of the foresaid secondary metabolites in the extracts.



Fig 1: Zone of inhibition – bacteria *Salmonella typhi*



Fig 2: Zone of inhibition – bacteria *Staphylococcus aureus*



Fig 3: Zone of inhibition – bacteria *Bacillus cereus*

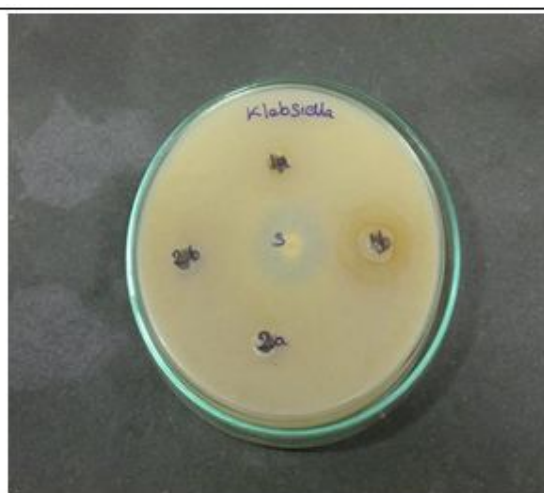


Fig 4: Zone of inhibition – bacteria *Klebsiella*

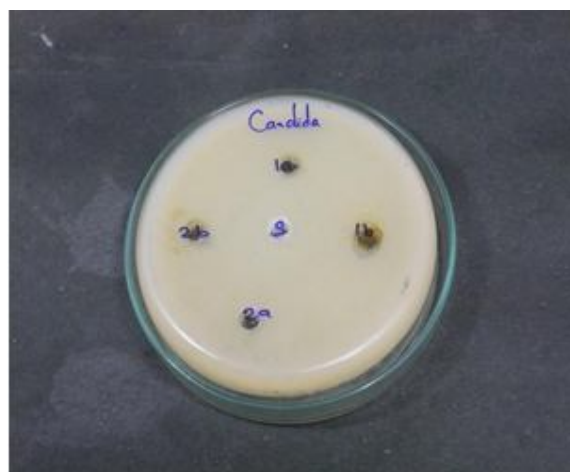


Fig 5: Zone of inhibition – Fungus *Candida*

4. Conclusion

Bioactive compounds such as alkaloids, flavonoids, terpenoids, sterols, carbohydrates, saponins and phenolic compounds were detected to be present in the roots of *Coriandrum sativum* plant. Since this plant had been used in the treatment of different ailment such as malaria, cancer and skin burn etc., the medicinal roles of these plants could be related to such identify bioactive compounds. The present study portrays that the phytochemicals in fresh *Coriander sativum* root may contribute in many significant ways for various studies in a truthful manner to the pharmaceutical activity of the plant.

5. Acknowledgement

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6. References

1. Ejoba R. Phytochemical constituents of some leaves extract of Aloe Vera and Azadirachta indica plant species. Global Advanced Research Journal of Environmental Science and Toxicology 2012; 1(2):014-017.
2. Mahajan RT, Badgular SB. Phytochemical Investigation of some Laticiferous Plants belonging to Khandesh Region of Maharashtra. Ethnobotanical Leaflets 2008; 12: 1145 – 52.
3. Thamaraiselvi P, Lalitha, Jayanthi P. Preliminary studies on Phytochemicals and Antimicrobial Activity of solvent extracts of *Eichhornia crassipes* (Mart.) Solms. Asian J Plant Sci Res 2012; 2(2):115-122.
4. Deepti K, Umadevi P, Vijayalakshmi G, Vinod polarao B. Antimicrobial Activity and Phytochemical Analysis of *Morinda tinctoria* Roxb. Leaf extracts. Asian Pacific Journal of Tropical Biomedicine 2012; S1440 – S1442.
5. Chandra Mohan S, Dinakar S, Anand T, Elayaraja R, Sathiya Priya B. Phytochemical, GC-MS analysis and Antibacterial Activity of a Medicinal Plant *Acalypha indica*. International Journal of PharmTech Research 2012; 4(3):1050-1054.