



ANTIMICROBIAL POTENTIAL OF VOLATILE OIL ISOLATED FROM SOME TRADITIONAL INDIAN SPICES

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Article Received on: 14/02/12 Revised on: 21/03/12 Approved for publication: 28/03/12

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ABSTRACT

In the present study the antimicrobial activity of Volatile Oils isolated from Traditional Indian Spices, *Anethum Graveolens* (Umbelliferae), *Foeniculum Vulgare* (Umbelliferae) and *Coriandrum Sativum* (Umbelliferae) were studied. The isolated Volatile Oils in varying concentrations were studied against *Staphylococcus Coagulase*, *E.Coli*, *Streptococcus fecaelis* and *Staphylococcus aureus*, by paper disc diffusion method, using Amoxicillin as standard drug. The results indicated that all the Volatile Oil samples from *Anethum Graveolens* (Dill), *Foeniculum Vulgare* (Fennel) and *Coriandrum Sativum* (Coriander) has antimicrobial potential and were active against almost all the microorganisms but in a dose dependent manner. *Foeniculum Vulgare* by far was the most potent volatile oil showing the highest activity against *Staphylococcus Coagulase*.

KEY WORDS: *Anethum Graveolens*, *Foeniculum Vulgare*, *Coriandrum Sativum*, Volatile Oil, Paper disc diffusion method.

INTRODUCTION

Spices have been used in food preparations in tropical and sub tropical countries for a long time¹. In Ayurveda & Greaco Arabic system of medicine, several spices are described as having Medicinal effects². Wilkins and Board reported that more than 1340 plants are known to be potential sources of antimicrobial compounds but that few have been studied scientifically³.

Coriandrum Sativum (L) was introduced to Chinese cooking and Medicine around AD 600, and in Indian System of Medicine it has found its importance at the ages of Charaka. In Chinese Meteria Medica, it is recommended for certain types of non pathogenic food poisoning caused by decaying matter. The parts used are leaves, seeds & oils. Volatile oil mainly acts on the digestive system, stimulating the appetite & relieving irritation. Leaves are widely used to flavour foods, Seeds are also ingredient of Curries and Pickling spices and bakery products⁴. Fennel (*Foeniculum vulgare* Mill) is a perennial herbaceous plant, in India it has been long used as a common spice and flavour as well as carminative, and in Brazil its seeds are used in domestic medicine and produce an aromatic essential oil used in the manufacture of liquorice-like drinks and perfume. It possesses a carminative and stimulant action. Dill (*Anethum graveolens* L.) is an annual plant indigenous to the western Mediterranean, reaching 75 cm in height; the plant is much used by the Indians, Romans, Egyptian and Jews. Its leaves are rich in essential oil containing limonene and carvone. The seeds are

used to preserve pickles, cheeses and mushrooms, and its essential oil is used to flavour drinks. It possesses antispasmodic, carminative and diuretic properties⁵.

MATERIALS AND METHOD:^{6,7,8,9}

Dill, Fennel and Coriander were collected from the market. The taxonomic identification was done by Authors after evaluating Pharmacognostic parameters. The seeds were crushed lightly to breakup into 2 halves. Then these were used for isolation of Volatile Oil using Clavenger's Apparatus. Pure culture Strains of *Staphylococcus Coagulase*, *E. Coli*, *Streptococcus fecaelis* and *Staphylococcus aureus* were collected from Dept. of Microbiology, Girijananda Chowdhury Institute of Pharmaceutical Science and were incubated at 37°± 0.1°C for 24 hrs by inoculation into nutrient broth.

Nutrient Agar media (Qualigens) was prepared and Sterilized in a flask and cooled to 45-50°C and was distributed by pipette (25ml) in each pre sterilized petridishes, previously inoculated with 0.01ml of the nutrient broth cultures and swirled to distribute the medium homogenously. Disks injected with various concentrations of Volatile Oil (10µl/ml, 50µl/ml and 100µl/ml) were applied on the solid agar medium by pressing slightly. The treated petridishes were placed at 4°C for one hour and then incubated at 37°±0.1°C for 24 hrs. Same was done for Standard drug Amoxicillin and Control (DMSO). Lastly, the zone of Inhibitions formed on the media was measured with a transparent ruler in millimeters.

RESULTS AND DISCUSSIONS

Table: 1

Oil and Standard	Staphylococcus Coagulase Zone of inhibition (mm)	E. Coli Zone of inhibition (mm)	Streptococcus fecaelis Zone of inhibition (mm)	Staphylococcus aureus Zone of inhibition (mm)
Dill 10 µl/ml	--	7	--	--
50 µl/ml	6	7	6	8
100 µl/ml	10	9	8	11
Coriander 10 µl/ml	4	6	8	8
50 µl/ml	6	6	9	10
100 µl/ml	9	10	12	13
Fennel 10 µl/ml	18	--	6	9
50 µl/ml	38	9	8	9
100 µl/ml	40	9	12	11
Std.(Amox.)10 µg/ml	3	6	7	9
50 µg/ml	5	7	9	12
100 µg/ml	7	9	12	15

Control Sample (DMSO) has not shown any Zone of Inhibition.

As shown by the results we can see that all the Volatile Oil samples of *Anethum Graveolens*, *Foeniculum Vulgare*, *Coriandrum Sativum* has shown Potent Antimicrobial activity against both Gm +ve and Gm -ve microorganisms *Staphylococcus Coagulase* (Gm -ve), *E. Coli* (Gm -ve), *Streptococcus fecaelis* (Gm +ve) and *Staphylococcus aureus* (Gm +ve). Volatile oil from Dill has shown maximum activity against *S. aureus* at a dose of 100 µl/ml, whereas at a concentration of 10 µl/ml it was inactive against *Staphylococcus Coagulase*, *Streptococcus fecaelis* and *Staphylococcus aureus*. Volatile Oil from Coriander has also shown maximum activity against *S. aureus* at a dose of 100 µl/ml, where as it has shown a dose dependent activity against all the micro organisms. Essential Oil from Fennel was most active against *Staphylococcus Coagulase* at a dose of 100 µl/ml.

CONCLUSION

It can be observed from the findings that all the Volatile Oils have shown antimicrobial activity against both Gm+ve and Gm-ve microorganisms and that also somewhat better than the Standard Antibiotic Amoxicillin. So, we can conclude that further studies should be carried out to bring out a Herbal antimicrobial formulation, which definitely will be less harmful than the Synthetic and Semi Synthetic Antibiotics used against common microbial infections.

ACKNOWLEDGEMENT

The Authors are very much thankful to Secretary and President SSA and to Principal GIPS, Azara, for providing

with the facilities to carry out the research work. The authors also would like to thank Mr. Bipul Nath, Asst. Prof. GIPS, for providing with the Microbial Strains needed to carry out the work.

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Source of support: Nil, Conflict of interest: None Declared