ANTIBACTERIAL ACTIVITY OF CARVONE CONTAINING ESSENTIAL OILS

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ABSTRACT

Antibacterial activity of carvone containing essential oils was investigated to evaluate in vitro antibacterial activity of against Bacillus megaterium, Staphyllococcus albus, Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli using disc diffusion method. All the essential oils have shown a good antibacterial activity compared to Streptomycin.

Keywords: Antibacterial activity, B. megaterium, S. albus, S. typhi, P. aeruginosa, E. coli

1. INTRODUCTION

Carvone, chemically is 2-methyl -5-(1-methylethenyl) 2- cyclohexane -1 one. It is liquid and immiscible in water and miscible in alcohol (The Merck Index, 1986). It forms two mirror images or enantiomers visibly, 5- (+) – Carvone and R – (-) – Carvone (Leitereg, 1971). Medicinally it is used as anti-acetylcholinestrase, anti-cancer against pulmonary and gastric carcinoma, anti-inflammatory, anti-microbial, anti-oxidant (Mahfuz, 2006), carminative (Harbone, 1999), CNS stimulant, motor depressant, nematicide, sedative, trichomonicide and vermifuge (Duke, 2001; Jaime, 2004). Carvone is used in the synthesis of Quassin (Shing, 1988). Pharmaceutically both carvones are used for freshening in food & flavour industry. It is also used as repellant and anti-feedant against pine weevil, Hylobius abietis (Schlyter, 2004)

The drugs containing carvone are fruits of Anethum graveolens, fruits of Carum carvi Linn, leave of Mentha spicata Linn, leaves of Zingiber officinale Roscoe and peels of Citrus reticulata Blanco.

Literature survey shows that essential oil of rhizome of Zingiber officinale was studied for anti-inflammatory & anti-nociceptive activities (Vendrusolo, 2006) and anti-bacterial activity (Dubey, 2005). Regarding Carvone, the survey shows that it has anti-acetylcholinestrase, anti-cancer against pulmonary and gastric carcinoma, anti-inflammatory, anti-microbial, anti-oxidant, carminative, CNS stimulant, motor depressant, nematicide, sedative, trichomonicide and vermifuge activities.

It is found that no comparative study on essential oils containing carvone is yet performed. Therefore an attempt was made to evaluate in vitro antibacterial activity of against gram positive and gram negative bacteria.

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2. MATERIALS AND METHODS

The fruits of Dill-Anethum graveolens, fruits of Caraway-Carum carvi Linn, leaves of Mentha-Mentha spicata Linn, leaves of Ginger-Zingiber officinale Roscoe and Orange/Manderian peels of Citrus reticulata Blanco were collected from local kirana, fruit, vegetable shop and farm of in and around of Aurangabad, (M.S.) India. All were authenticated by the taxonomist of Department of Botany, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, (M.S.) India.

The cultures of bacteria viz. Bacillus megaterium, Staphyllococcus albus, Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli were obtained from the department of Botany, Institute of Science, Aurangabad, (M.S.) India.

The umbelliferous fruits were milled separately into course powder into a mechanical grinder. The leaves were cut into pieces. The resulting fruit and leaf materials (100g) were then extracted with the help of Clavengers apparatus using hydro distillation method (Khandelwal, 2002). The oils collected were used for the study.

The activities were evaluated using two different culture medium: (1) Nutrient agar (for Gram positive bacteria) (2) and MacConkey agar (for Gram negative bacteria). The in vitro activity of various essential oils containing carvone was evaluated by disc diffusion method (Indian Pharmacopoeia, 1996). The sterile discs (6 mm in diameter) were impregnated with 40 il/disc of

essential oils. The oils were tested against Bacillus egaterium, Staphyllococcus albus, Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli. The activity of the oils was compared with streptomycin, which was used as an antibacterial standard. The plates were incubated at 37°C for 48 hours. The zone of inhibition was calculated by measuring the diameter of zone without microbial growth.

3. RESULT AND DISCUSSION

Five oil samples from umbelliferous fruits, leaves and peels were isolated and tested for antibacterial activity for Gram positive bacteria and for Gram negative bacteria, viz. Bacillus megaterium, Staphylococcus albus, Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli.

All five oils showed activity against Bacillus megaterium, Staphylococcus albus, Salmonella typhi, Pseudomonas aeruginosa, and Escherichia coli comparable to Streptomycin. Out of which Zingiber officinale oil showed maximum activity against Escherichia coli and Mentha spicata showed maximum activity against Staphylococcus albus.

4. ACKNOLEDGEMENT

The author is thankful to Dr.R.Y.Khedkar, Secretary, Shri Bhagwan College of Pharmacy, Aurangabad for allowing to do work and Mr.S.V.Shaikh, Laboratory Assistant for his kind help during the work.

Table 1. Antibacterial activity of carvone containing essential oils by disc diffusion method

Name of oil	Paeruginosa	B.megaterium	E. coli	S. typhi	S. albus
	Zone of inhibition in mm				
Dill oil	12	11	12	10	13
Caraway oil	14	12	12	10	12
Mentha oil	12	12	11	10	12
Ginger leaf oil	13	11	14	12	13
Manderian peel oil	10	11	12	10	14
Streptomycin	16	18	16	16	18

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