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Antibacterial activity of some local plant essential oils on clinical bacteria and yeasts

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Abstract

Sixteen plant essential oils were tested for the antibacterial activity against *Staphylococcus aureus, E.coli, Pseudomonas aeurigunosa, Protus mirablies* isolated from diabetic foot ulcer and Candida *albicans* isolated by agar well diffusion method. Essential oils including clove oil, thyme oil, hermal oil, ginger oil, garlic oil, sage oil, cinnamon oil , lavender oil, mint oil, rosemary oil and black seed oil ,Mastic oil, Taramira oil, Aloe oil, Canfor oil and Linseeds oil)).The results showed that

P. aeruginosa isolates for antibiotics were tested, all isolates were sensitive to Gentamycin, Piperacillin and Amikacin Ciprofloxacin, and resist to Tetracyclin, Amoxicillin, Cephalexine , Ceftriaxone. Ciprofloxacin and Amikacin were found effective against *P. aeruginosa* isolates with MIC values of 3.8 µg/ ml for Ciprofloxacin and 0.244 µg/ ml for Amikacin The antibacterial effect of Different concentrations of *Aloe vera* gel, Sesame Oil and Camphor Oil against *P. aeruginosa* were determined, Camphor was highly effective with Concentration inhibit bacteria value of 10% followed by Sesame Oil (20%) and *Aloe vera* gel (>75%). The combinations of *Aloe vera* gel, Sesame Oil and Camphor Oil and antibiotics (Ciprofloxacin and Amikacin) showed that the efficacy of the two antibiotics (Ciprofloxacin and Amikacin) against *P.aeroginosa* isolates was improved in the presence of *Aloe vera* gel, Sesame Oil and Camphor Oil.

Key word: Plant essential oils**,** Antibacterial activity, bacteria, yeast

INTRODUCTION

Plants are important source of natural products which are rich in a wide variety of secondary metabolites with antimicrobial properties, such as tannins, terpenoids, alkaloids, and flavonoids (Bouzada Maria et al., 2009), .**(Lebanon)** as well as steroidal saponins, phenolic acids, lactones, quinones essential oil, and polyphenols (Cowan, 1999) **(indigenous Plants).** Interest in medicinal plants has increased in recent years and lead to the discovery of new biologically active molecules by the pharmaceutical industry and the adoption of crude extracts of plants for self-medication by the general public (Ahmad and Aqil, 2006) .**(Lebanon).**

Essential oils are complex natural mixtures of volatile secondary metabolites, isolated from plants by hydro- or steam distillation. The main constituents of essential oils including carbohydrates, alcohols, ethers, aldehydes and ketones, are responsible for the fragrant and biological properties (Reichling, 1999) **(indigenous Plants)** such as inflammatory, antioxidant and anticancerogenic properties (Golab et al., 2005; Naser et al., 2005; Ito et al., 2008**) (indigenous Plants)**

The antimicrobial activity of essential oils plants and their main components against a wide range of microorganisms including antibiotic-resistant species of bacteria, fungi (Alviano et al., 2005; Carson and Riley, 1995; El Kabouss et al., 2002), yeast and filamentous fungi (Delaquis et al., 2002; Gowda et al., 2004; Vagi et al., 2005) in addition to Gram-positive and Gram-negative bacteria (Ali et al., 2002; Sechi et al., 2001). (**Fruit juices)**

The present investigation aimed at studying the antimicrobial activity of some plant essential oils against *Nocardia* associated with the respiratory infection and accordingly the possibility of using these oils as natural treatment of this bacteria.

Materials and Methods

Plant essential oils

Sixteen plant essential oils (Clove oil, Thyme oil, Hermal oil, Ginger oil,Garlic oil, Sage oil, Cinnamon oil , Lavender oil, Mint oil, Rosemary oil , Black seed oil, Mastic oil, Taramira oil, Aloe oil, Canfor oil and Linseeds oil) were furnished from local market .

Antibacterial activity of **plant essential oils**

Four bacterial isolates of *Staphylococcus aureus, E.coli, Pseudomonas aeurigunosa, Protus mirablies* were isolated from diabetic foot ulcer and *Candida albicans* isolated from . All the bacterial strains used throughout the present investigation were maintained on nutrient agar slants and stored at 4°C with regular transfer at monthly intervals. The agar well diffusion assay as described by Kudi *et al.* (1999) was used to determine the inhibitory effect of various plant oils on the bacterial growth. A sterile cork-borer (5 mm diameter) was used to make wells in the set agar. A McFarland 0.5 standardized bacterial suspension is swabbed over the surface of a Mueller-Hinton agar plate. 100µl of the plant oils were added to each well and the plates were incubated overnight at 37°C. Antibacterial activity was recorded if a zone of growth inhibition around the well is present (Mahon et al., 1998).

Determination of minimal inhibitory concentration (MIC) and **minimal bactericidal concentration (MBC)**of some plant oils

According to the Clinical and Laboratory Standards Institute (2009) , agar dilution method was used for determining MIC and MBC of some plant oils .Stock solution of oil in DMSO was diluted to give different concentrations (5,10, 15,20,25,30,35,40,45,50,55,60,65,70,75%) , 2 ml of each concentration were added to 18ml Mueller Hinton agar . An inoculum of 100 µl at 1×10^6 CFU/ml from each *Nocardia* isolate was spotted on each plate and incubated at 37°C for 24h. The highest oil dilution not exhibiting bacterial growth was taken as the MIC. After the MICs were determinated, 100 µl aliquots from each dilution were plated onto Müller-Hinton Agar and incubated at 37ºC for 18 hrs (Rota et al., 2008). Following incubation, the highest dilution not exhibiting bacterial growth was recorded as the minimal bactericidal concentration (MBC).

Statistical analysis

Result:

Antibacterial activity of local plant essential oils

Table (1): Inhibition zones diameter (mm) of isolates used in this study against local plant essential oils

Isolate / Essential oil	*S.aureus*	*E.coli*	*P.mirablis*	*Ps.aeruginosa*	*C.albicans*
A	-	-	-	-	-
B	20	15	15	-	-
C	12	-	-	-	-
D	-	-	-	-	-
E	-	-	-	-	-
F	32	40	33	40	-
G	-	-	-	-	-
H	25	34	-	-	11
I	-	-	-	-	-
J	-	-	-	-	-
K	-	-	-	-	-
L	-	-	-	-	-
M	36	12	-	15	64
N	-	-	-	-	-
O	-	-	-	-	-
P	-	-	-	-	-

(A) Garlic oil, (B) Clove oil, (C) Thyme oil, (D) Ginger oil, (E) Hermal oil, (F) Cinnamon oil, (G) Mint oil, and (H) Black seed oil, (I) Rosemary oil, ,(J) Lavender oil, (K) Sage oil, (L) Mastic oil, (M) Taramaric oil, (N) Aloe oil, (O) Canfor oil and (P) Linseeds oil.

Determination of minimal inhibitory concentration (MIC) of some plant essential oils

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