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RESEARCH ARTICLE

MEDICINAL CHEMISTRY

ANTIMICROBIAL ACTIVITY PATTERN OF CERTAIN TERPENOIDS

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ABSTRACT

Some Pathogens are resistant to various antimicrobial agents. The essential oils/terpenoids were found to exhibit antimicrobial activity against *P.aeruginosa, E.coli, S.aureus and C.albicans*. In the present study GRAS (generally recognized as safe) terpenoids are grouped according to the structure and their MIC (minimum inhibitory concentration), studied to specify the activity of terpenes against *P.aeruginosa, E.coli, S.aureus and C.albicans* pathogens. It is concluded that the terpenoid from natural resources could combat the resistant pathogens and make environmentally benign antimicrobial agents.

KEYWORDS

MIC, terpenoids, antimicrobial agents.

INTRODUCTION

Many plants containing volatile oil, either in bark, flowers, fruit, leaves, root and other plant parts consists primarily monoterpenes, sesquiterpenes and polyphenols, which can combat with the problem of resistant bacteria and drug residue hazards[1].

A wide variety of essential oils in vitro have been shown to exhibit antimicrobial activity against various bacterial pathogen, yeasts or molds[2]. Terpenoids, which are GRAS (generally recognized as safe) have been found to inhibit the growth of cancerous cells, decreases tumor size, decrease cholesterol level and also decrease micro-organism concentration[3,4]. The antimicrobial properties of phytochemicals have thus generated interest in determining their structure v/s activity as a broad spectrum antimicrobial agent.

MATERIALS AND METHOD

In the present study five groups (Table-1) were made based on the minimum inhibitory concentration (MIC) and to specify the activity of certain terpenes against *P.aeruginosa, E.coli, S.aureus and C.albicans*[(5)] adopting zone of inhibition method to compare the antimicrobial activity of terpenes [(6,7,8)].

Analysis was used to confirm these grouping and to generate a plot of means (fig.1), which shows these differences graphically.

TABLE -1

Minimum inhibitory concentration (ppm) against P.aeruginosa, E.coli, S.aureus and C.albicans

S. no.	Compound	P.aeruginosa	E.coli	S.aureus	C.albicans
P-Menthane (Group-1)					
1.	(R)-(-)-Carvone	3800	1900	5600	9600
2.	1,8 cincole	>18100	9100	>18100	9100
3.	(±)-menthol	>19100	19100	10000	500
4.	α-Terpineol	>18300	1900	1900	930
5.	Terpinen-4-ol	6200	1900	1900	930
Bicyclic (Group-2)					
1.	(1R)-(-)-Myrtanal	9800	3000	2000	990
2.	(1R)-(-)-Myrtanol	18700	950	950	720
3.	(+)-α-Pinene	16800	>16800	>16800	1680
4.	(-)-α-Pinene	16800	>16800	12700	3400
Ethers and Oxides (Group-III)					

1.	Linalool oxide	1900	9400	>18500	5500
2.	Limonene oxide	>18200	1900	>18200	4200
3.	α-Pinene oxide	>16800	>16800	12700	3400
4.	β-Pinene oxide	>16800	>16800	>16800	>16800

Carenes, Aromatic ethers acetates bicyclic hydrocarbons (Group-IV)

1.	Car-3-ene	>16900	>16900	>16900	>16900
2.	(+)-Camphene	9600	9600	9600	9600
3.	(±)- Camphor	9800	4500	3000	2000
4.	Eugenol	10600	2100	2100	800
5.	Methyl acetate	18100	>18100	>18100	>18100

Acyclic (Group-V)

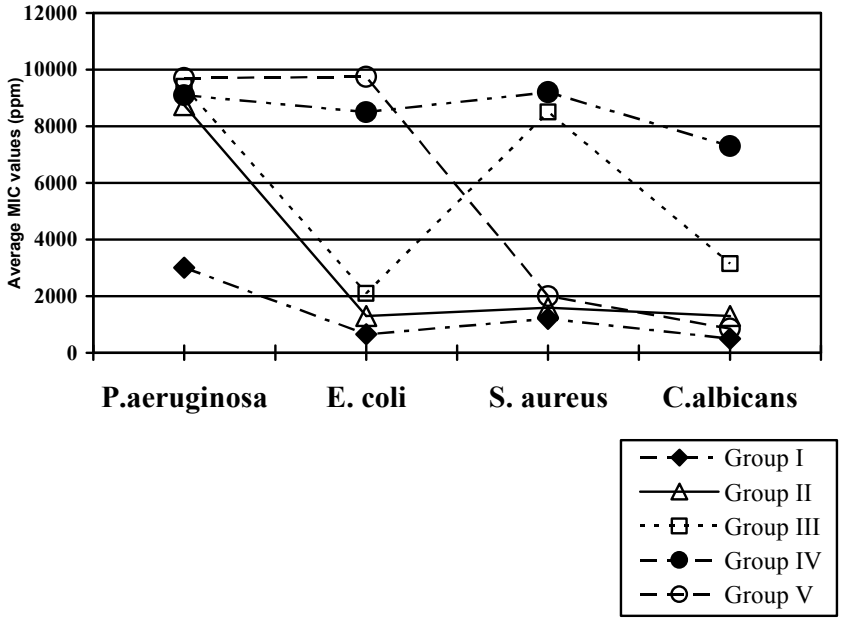
1.	(R)-(+)-Citronellal	>16700	>16700	2100	850
2.	β-citronellol	>16800	>16800	860	430
3.	Geraniol	>17400	1800	890	440
4.	Linalool	>17100	1700	1700	1300
5.	Nerol	>17200	880	880	880

RESULTS AND DISCUSSION

Hierarchial cluster analysis (Fig. 1) of the activity reveals that 23 terpenoids categorized in five groups based on the concentration and specificity of their activity against P.aeruginosa, E.coli, S.aureus and C.albicans[9]. This have been ploted by making cluster of these group which shows the differences graphically. It can be seen from the figure that the terpene activity groups vary from inactive against all four organisms (Group IV) to active against all four organisms (GroupI).

Figure-1

Activity patterns of terpenoid groups represented by a plot of mean Minimum Inhibitory Concentrations for each group against P.aeruginosa, E.coli, S.aureus and C.albicans



CONCLUSION

It is clear from the study that various terpenoids from natural resources could combat the resistant pathogens and could be futuristic environmentally benign antimicrobial agents.

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