

ANTIMICROBIAL ACTIVITY OF CONSTITUENTS IDENTIFIED IN ESSENTIAL OILS FROM MENTHA AND CINNAMOMUM THROUGH GC-MS**NEERJA GUPTA AND GOLDY SAXENA***

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* *Corresponding Author* goldyangel@rediffmail.com**ABSTRACT**

GS/MS of essential oils from Cinnamomum camphorum and Mentha piperita revealed the main chemical components, bornyl acetate, terpinen-4-ol, 1,8 cineole, camphor, eugenol, limonene, α -pinene, β pinene, geraniol, cinnamaldehyde, linalool, borneol and menthol. GC-MS studies of the essential oils of Mentha piperita and Cinnamomum camphorum have revealed the major constituents as menthol and camphor respectively as per the retention time (area 30.07% ,mol.wt. 156.26 for menthol and 67.66% area, mol.wt.142 for camphor). Two terpenoids were subjected for the study of their antimicrobial activity against E.coli and S.aureus. Menthol showed greater zone of inhibition in 24 hrs. at maximum 2% concentration , while less zone of inhibition in 24 hrs. was observed at 2% concentration with camphor. Structure – activity relationship has been observed in the following trend. Methoxy terpene > Alcoholic Terpene > Ketonic terpene On the basis of the above observation these terpenes can be used as natural medicines in the treatment of several diseases like cold & Flu, infectious diseases, bronchitis and also as flavouring liquors, cosmetics, fragrances etc.

KEY WORDS

Essential oils, Menthol, Camphor, Antimicrobial activity

GENERAL INTRODUCTION

The spread of drug resistant pathogens is one of the most serious threats to successful treatment of microbial diseases¹. Therefore, essential oils and other extracts of plants have evoked interest as sources of natural products². Essential oils (also called volatile oils) are aromatic oily liquids obtained from plant materials (flowers, leaves, buds, seeds etc)³ Essential oils are complex mixers comprising many single compounds. Chemically they are derived from terpenes and their oxygenated compounds. Essential oils have been shown to possess antibacterial, antifungal,

antiviral, insecticidal and antioxidant properties⁴. Essential oils are also becoming more popular and are now added to many different products for a multitude of medicinal reasons⁵.

For the essential oil industry to remain competitive in the world market steps must be taken to understand exactly how essential oils and active terpenes present in these oils are bioactive. In the present study the two essential oils namely Camphor oil and Pippermint oil have been screened for their

potential uses as alternative remedies for the treatment of many infectious diseases caused by various bacterial pathogens such as *Escherichia.coli*, *Staphylococcus.aureus* etc.

METHODOLOGY USED

The two essential oils were selected based on literature survey and their use in traditional medicine. The two oils were subjected to GC-MS technique in order to determine the majoritary compounds. One strain of gram-negative bacteria [*Escherichia. coli* (ATCC-25922)] and gram positive bacteria [*Staphylococcus.aureus* (ATCC-25923)] were used. Nutrient Agar media and Ma Conkey Agar media.was used for the cultivation of *E.coli* and *S.aureus* respectively.Disk diffusion method was used to test the antimicrobial activity of major

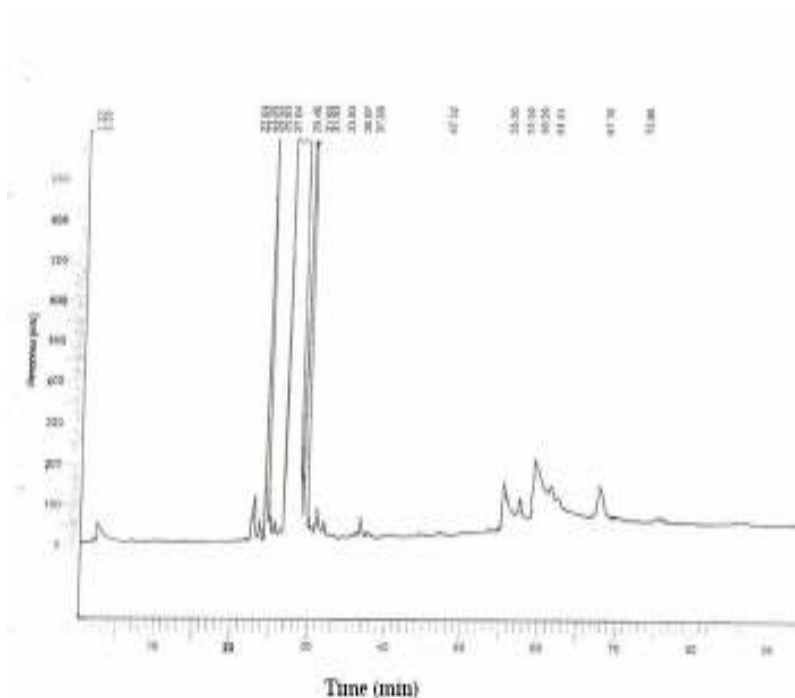
active principles from camphor and mint oil². Experiment was done in triplicates. The contact effect of identified terpenes (camphor, menthol) on pathogens and zone of inhibition of bacterial lysis due to the various concentration of terpenes were observed after 24 hrs. Comparison of antimicrobial activity of menthol and camphor was observed at different concentrations.

OBSERVATION & RESULTS

GC-MS of *Cinnamomum camphorum* indicates the major terpene as camphor with area 67.66% and mol.wt-142 shown in figure-1 whereas GC-MS of *Mentha piperita* indicates menthol as major terpene with area 30.07% and mol.wt-156.26 shown in figure-2

Figure -1
GC-MS of *Cinnamomum Camphora* Oil

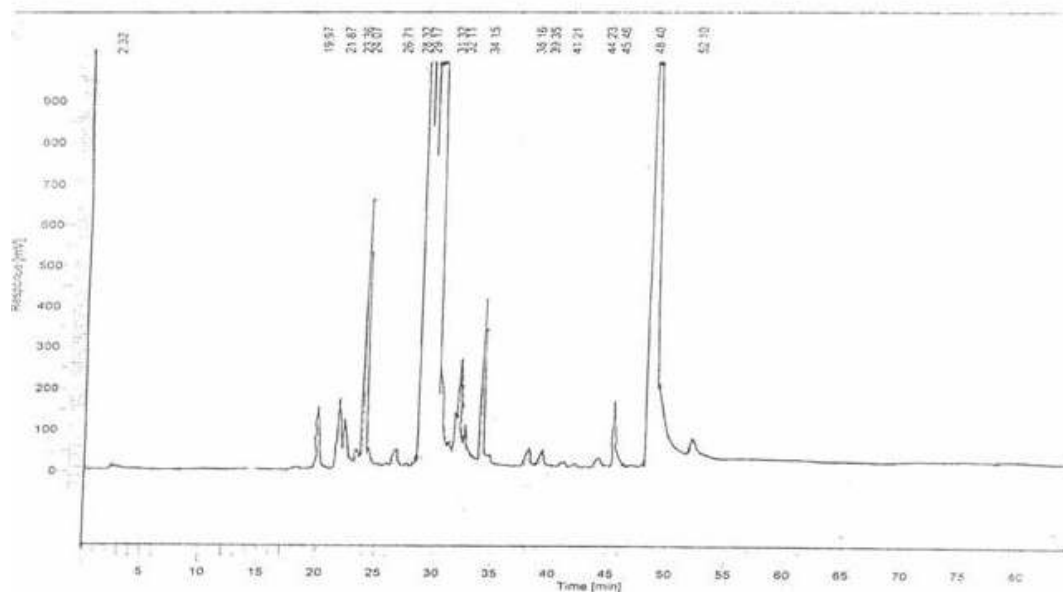
Sample Name	: <i>Cinnamomum Camphora</i> Oil	Rack/Vial	: 0/0
Instrument Name	: GC	Sample Amount	: 1.000000
Dilution Factor	: 1.000000	Cycle	: 1
Date	: 5/25/2004 2:06:23PM	Data Acquisition Time	: 5/25/2008 11:50:07 AM



Peak #	Time (min)	Area (%)	Peak #	Time (min)	Area (%)
1	1.318	0.00	13	31.926	0.19
2	1.835	0.02	14	33.929	0.00
3	2.332	0.38	15	36.067	0.06
4	22.641	0.48	16	36.655	0.57
5	22.957	1.18	17	37.686	0.07
6	23.582	0.48	18	47.320	0.00
7	24.534	1.91	19	55.304	2.10
8	25.625	0.33	20	57.501	0.45
9	26.229	0.05	21	59.293	0.29
10	27.040	67.66	22	61.314	0.02
11	29.462	13.04	23	67.757	0.11
12	31.038	0.64	24	72.856	0.01

Figure -2
GC-MS of *Mentha piperita* Oil

Sample Name	: <i>Mentha piperita</i> Oil	Rack/Vial	: 0/0
Instrument Name	: GC	Sample Amount	: 1.000000
Dilution Factor	: 1.000000	Cycle	: 1
Date	: 5/18/2004 5:11:08PM	Data Acquisition Time	: 5/18/2008 3:42:13 PM



Peak Number	Time (min)	Area (%)	Peak #	Time (min)	Area (%)
1	2.316	0.02	13	31.317	0.50
2	19.969	1.22	14	31.817	0.86
3	21.869	1.69	15	32.109	2.42
4	22.270	1.06	16	32.649	0.95
5	23.363	0.25	17	34.153	3.18
6	23.675	0.13	18	38.158	0.30
7	24.069	5.67	19	39.352	0.30
8	26.708	0.49	20	41.210	0.04
9	28.315	0.04	21	44.226	0.28
10	28.727	14.41	22	45.462	1.72
11	29.174	11.08	23	48.400	22.72
12	29.627	30.07	24	52.097	0.59
					100.00

On comparing the antimicrobial activity of menthol and camphor it was observed that menthol showed greater antimicrobial activity than camphor at 2% concentration (fig 3 and 4).

Figure-3
Zone of inhibition of Menthol and Camphor against E.coli at 2% concentration

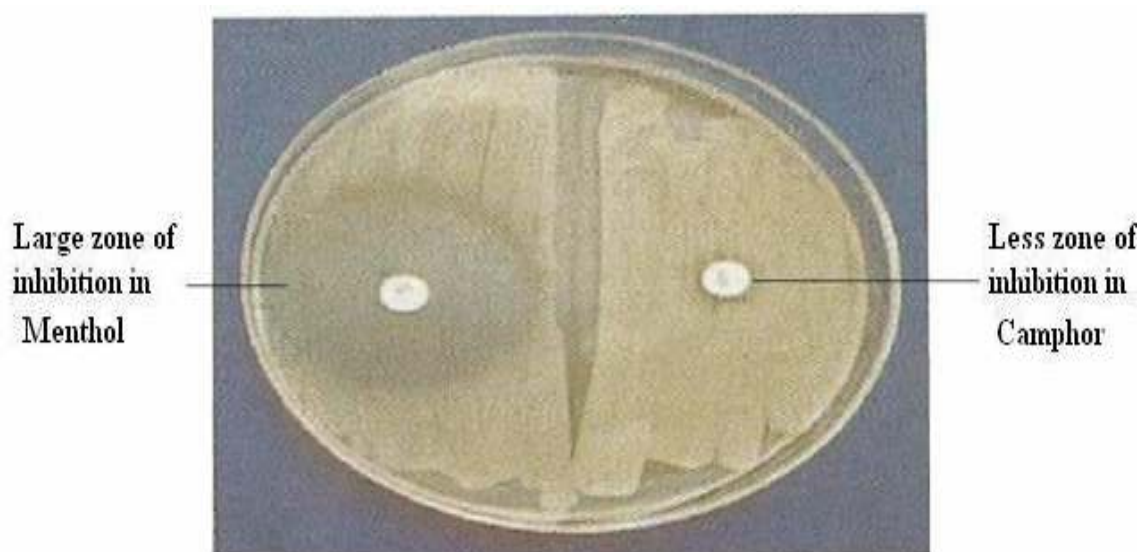
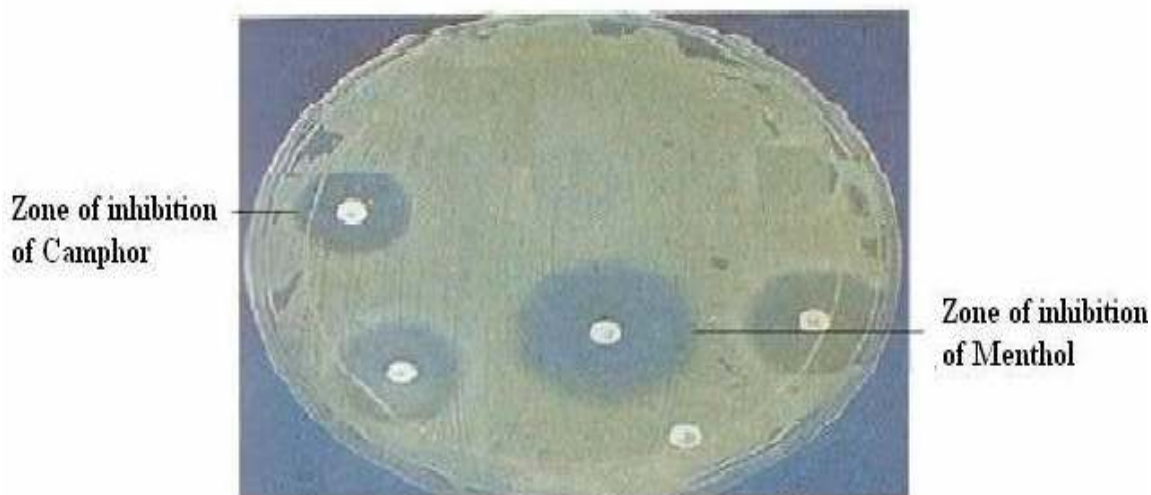


Figure-4
Zone of inhibition of Menthol and Camphor against S.aureus at 2% concentration



CONCLUSION

It is clear from the study that alcoholic group in menthol is more effective than the ketonic group in camphor i.e; Alcoholic terpene > Ketonic terpene. Therefore the proposed study "ANTIMICROBIAL ACTIVITY OF

CONSTITUENTS IDENTIFIED IN ESSENTIAL OILS FROM MENTHA AND CINNAMOMUM THROUGH GC-MS" is taken up for the benefit of mankind and the count

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