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Chemical Composition and Evaluation of The Biological Activities of The Essential Oil of Cymbopogon Citratus Mill

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Abstract

This study aims to evaluate the chemical composition, antioxidant and anti-inflammatory properties of the essential oil of lemongrass (Cymbopogon citratus). The essential oil was extracted by hydrodistillation and its chemical composition was analysed by gas chromatography-mass spectrometry. The antioxidant activity was evaluated by two methods, DPPH (2,2-diphenyl-1-picrylhydrazyl), phenanthroline assay, the anti- inflammatory activity was estimated by the protein denaturation method. The essential oil of C, citratus has Geranial (28.93%), Neral (24.30%) and β -Myrcene (23.92%) as majority compounds. This study revealed moderate antiradical activity of C, citratus (IC50 = 163.12 % µg/ml) compared to those of reference antioxidants. While, phenanthroline activity showed a significant EC50 (7.80 ± 1.42). In addition, C, citratus has a very high anti-inflammatory activity with percentage of inhibition of 78.15% compared to Diclofenac sodium (96.42 %).

Introduction

The use of synthetic antioxidants and anti-inflammatories as a matter of routine is being questioned because of the negative effects on consumer health that have recently been attributed to them. Thus, new natural substances of plant origin with antioxidant and anti-inflammatory properties are being sought. In this regard, essential oils are of increasing interest because of their richness in carbonyl compounds, secondary metabolites of the terpene series, hydrocarbons with the carbonyl group (C=O), including aldehydes and ketones, which find their uses in various fields of application, notably in the food, pharmaceutical, chemical and c.osmetic industries. This study aims to evaluate the chemical composition, antioxidant and anti-inflammatory properties of the essential oil of Algerian cymbopogon citratus mill.

Materials and Methods

Plant material , extraction, and identification of essential oil components

Cymbopogon citratus

Clevenger appareil

Essential oil

GC/MS instrument

Anti-Inflammatory Activity

In vitro anti-inflammatory activity was tested via the protein denaturation method using bovine serum albumin (BSA) as described by [1].

DPPH Radical Trapping Test

The effect of cymbopogon citratus essential oils on DPPH (2, 2-diphenyl-1- picrylhydrazyl) radical was assessed according to the method described by [2].

Phenanthroline Test

The phenanthroline was determined according to the previously published method [3].

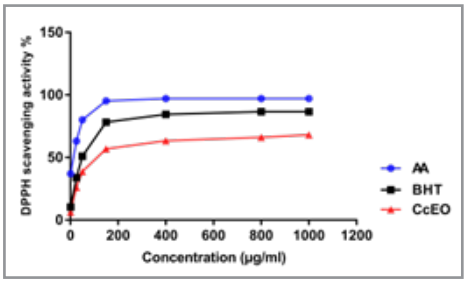
Results & Discussion

Table 1: Chemical composition of C. Citratus Essential oil

Compound	Apex RT	%Area
b-Myrcene	88.31	23.92
D-Limonene	9.74	0.07
(z)-β-Ocimene	10.19	1.47
3-Carene	10.67	0.99
Linalol	13.31	1.99
Citronellal	16.22	0.41
Nerol	20.83	0.16
Citronellol	16.22	0.41
Neral	21.76	24.30
Linalool	22.60	4.57
Geranial	23.69	28.93
Geranyl acetate	30.33	2.42

The main volatile components present in the C. citratus EO are Geranial (28.93 %), Neral (24.30 %), beta-Myrcene (23.92 %)

Antioxidant Activity



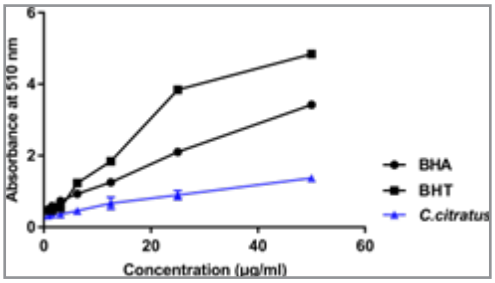
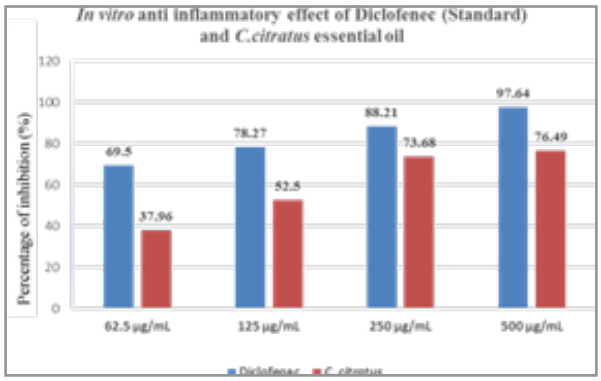


Table 2: Antioxidant activity of the C. citratus essential oil

Extract	IC50 values (µg/mL)	
	DPPH Scavenging activity	Phenanthroline assay
C. citratus	104.68 ± 3.01	7.80 ± 1.42
Ascorbic acid	6.27	NT
BHT	22.32 ± 1.19	2,24 ± 0,17
BHA	5.73 ± 0.41	0,93± 0,07

Values are means ± standard deviation of triplicate replications; BHT: butyl hydroxytoluene; BHA: Butylhydroxyanisole; NT: Not tested; IC50: C, citratus essential oil or standards concentrations corresponding to 50% of antioxidant activity or 0.5 of absorbance in phenanthroline assays.

Anti-inflammatory activity



Conclusion

In summary, one of the main findings in this study was that the EO extracted from Cymbopogon citratus collected from Chiffa, Algeria showed good antioxidant and anti-inflammatory activities that may be linked to the presence of high amount Geranial, Neral and beta-Myrcene and could be considered in the formulation in new food products and dietary recommendations.

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