Asteraceae plants as potential source of effective acetylcholinesterase inhibitors

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INTRODUCTION

Some plants, such as *Santolina chamaecyparissus* L. (SC) and *Ambrosia peruviana* Willd. (AP), have been found to have acetylcholinesterase inhibitory activity, which is important in the treatment of Alzheimer's disease. The medicinal properties of these plants have been extensively studied and attributed to certain sesquiterpenes components [1-2].

The objective of this study was to evaluate the antioxidant activity and acetylcholinesterase inhibitory activity of two dichloromethane extracts (DCME) from SC and AP, as well as to isolate and purify the bioactive compounds responsible for these activities.

MATERIAL AND METHODS

The extracts were prepared by macerating SC and AP in dichloromethane for 14 days. The solvent extracts were then evaporated and subjected to fractionation and purification to obtain the bioactive compounds. Bioguided fractionation was conducted on the DCME-SC and DCME-AP using the DPPH method to identify the bioactive compounds. Each DCME was passed through a chromatographic column packed with silica gel, with hexane:ethyl acetate mixtures of increasing polarity used as eluent. The active fractions were further purified through flash column chromatography, resulting in the purification of four compounds in both extracts.

The antioxidant activity was quantified using the DPPH method [3], while the acetylcholinesterase activity was evaluated using Ellman's method [4]. The extracts were also analyzed using GC-MS [5] and the compounds were identified and characterized by ^{1}H and ^{13}C NMR spectra.

RESULTS

All the isolated compounds (1-4) and both extracts showed potent antioxidant activity and were active against acetylcholinesterase. Compounds 2-4 exhibited IC_{50} values below 15 µM in the DPPH assay, indicating strong antioxidant activity. Compounds 1 and 2 were the most effective acetylcholinesterase inhibitors (Tables 1 and 2).

Table 1: Antioxidant activity and AChE inhibitory activity of nonpolar extracts

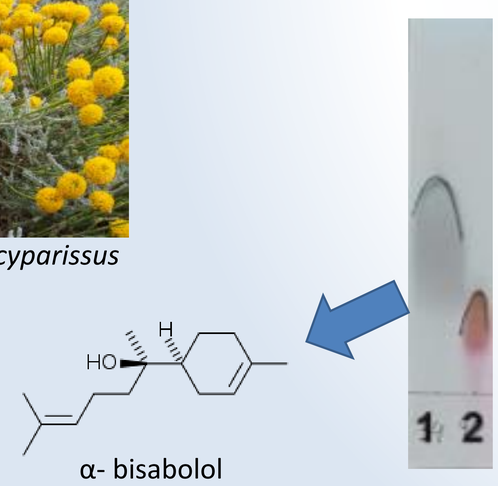
Extracts	eel AChE IC_{50} (µg/ml ± SD)	AO IC_{50} (µg/ml ± SD)
DCME-SC	60.25 ± 0.09	15.35 ± 0.22
DCME-AP	68.21 ± 0.12	9.96 ± 0.13

AChE structure

Table 2: Antioxidant activity and AChE inhibitory activity of compounds 1-4

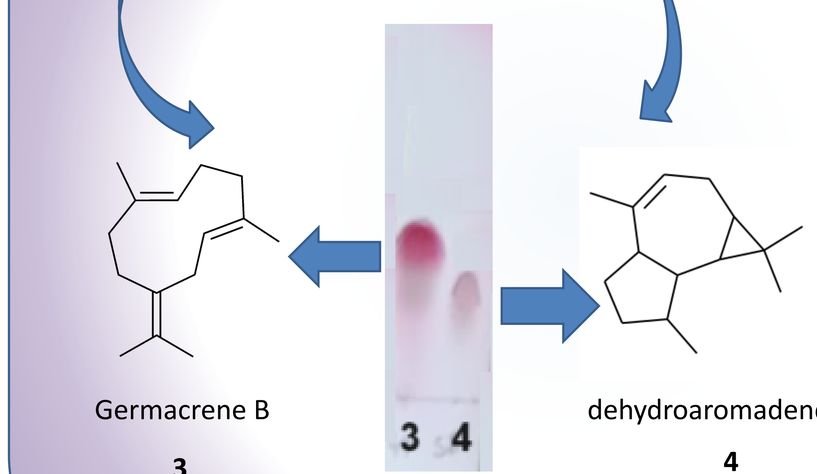
Source	Compounds	eelAChE IC_{50} (µM ± SD)	AO IC_{50} (µM ± SD)
DCME-SC	α-bisabolol (1)	6.04 ± 0.23	43.31 ± 0.35
	manool (2)	14.96 ± 0.19	5.26 ± 0.28
DCME-AP	germacrene B (3)	27.12 ± 0.96	6.52 ± 0.24
	Dehydroaromadendrene (4)	33.89 ± 0.28	13.96 ± 0.37
trolox		ND	30.68 ± 0.52
galantamine		1.257 ± 0.0238	ND

Santolina chamaecyparissus



AChE: Compounds **1** and **2**, show IC_{50} < 15 µM.

Ambrosia peruviana



AO: Compounds **2 - 4**, show IC_{50} < 15 µM.

CONCLUSION

The dichloromethane extracts of SC and AP contain compounds with antioxidant and potential anti-Alzheimer's activity. These findings suggest that these plants could be utilized in the pharmaceutical or food industry, as well as for the development of new therapeutic agents.

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