Cholinesterase Inhibitory and Antioxidant Properties of *Verbascum mucronatum* Lam. and its Secondary Metabolites

Cigdem Kahraman[a], I. Irem Tatlı[b,*], Ilkay Erdogan Orhan[c], and Zeliha S. Akdemir[a]

[a] Department of Pharmacognosy, Faculty of Pharmacy, Hacettepe University, 06100, Ankara, Turkey
[b] Department of Pharmaceutical Botany, Faculty of Pharmacy, Hacettepe University, 06100, Ankara, Turkey. Fax: +90-312-3114777. E-mail: itatli@hacettepe.edu.tr
[c] Department of Pharmacognosy, Faculty of Pharmacy, Gazi University, 06330, Ankara, Turkey

* Author for correspondence and reprint requests

Z. Naturforsch. **65 c**, 667–674 (2010); received March 31/July 12, 2010

The aqueous extract of *Verbascum mucronatum* Lam. along with its fractions and secondary metabolites were assessed for their antioxidant, acetylcholinesterase (AChE), and butyrylcholinesterase (BChE) inhibitory activities. The antioxidant activity was evaluated by three methods: as 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, ferrous ion-chelating effect, and ferric-reducing antioxidant power (FRAP) tests. The AChE activity was determined by the Ellman method using an ELISA microplate reader. Phytochemical investigations revealed the presence of four iridoid glucosides, ajugol (**1**), aucubin (**2**), lasianthoside I (**3**) and catalpol (**4**), two saponins, ilwensisaponin A (**5**) and C (**6**), and a phenylethanoid glycoside, verbascoside (**7**), in *Verbascum mucronatum*. Their structures were elucidated by spectral techniques. The aqueous extract and fractions including the phenylethanoid glycoside **7** showed DPPH scavenger effect and had the best FRAP. Besides these results, one of the phenylethanoid fractions displayed the highest ferrous ion-chelating effect. While only **7** was found to possess moderate AChE inhibition, the extract, fractions, and all other tested compounds did not inhibit AChE and BChE.

Key words: Verbascum, Antioxidant Activity, Cholinesterase Inhibition