

## Antiproliferative, antimicrobial and antioxidant activities of the chemical constituents of *Ajuga turkestanica*

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### Abstract

*Ajuga turkestanica* Rgl. Brig (Lamiaceae) is a medicinal plant from Uzbekistan. Methanol, chloroform, butanol, and water extracts as well as isolated phytoecdysteroids and iridoids were evaluated for their antioxidant, cytotoxic and antibacterial activities. Water and butanol extracts exhibited good antioxidant activity with IC<sub>50</sub> values of 7.24 ± 0.82 and 14.57 ± 1.64 µg/mL. The chloroform extract showed potent cytotoxic effects against the cancer cell lines HeLa, HepG-2, and MCF-7 with IC<sub>50</sub> values of 7.13 ± 0.85, 9.03 ± 0.92, and 10.77 ± 1.44 µg/mL, respectively. Compared to the extracts, isolated phytoecdysteroids and iridoids showed weak cytotoxic activity. The chloroform extract has antimicrobial properties even against multiresistant strains like *Staphylococcus aureus* MRSA 1000/93 and *Streptococcus pyogenes* ATCC 12344. The methanol and chloroform extracts of *A. turkestanica* were further investigated for their GLC-volatile components using GLC/FID and GLC/MS. Pregna-4,9 (11)-dien-20-ol-3-on-19-oic acid lactone (19.58%), 20-methyl-pregna-5,17-dien-3β-ol (12.93%), 3,7-dioxocholan-24-oic acid (10.53%) and betulin (10.18%) were detected as the major compounds.

**Keywords:** *Ajuga turkestanica*; phytoecdysteroids; iridoids; HPLC; GLC; activity

### Introduction

More than 45 species of the genus *Ajuga* L. (Lamiaceae) are found in temperate regions of the Old World and have been used in folk medicine because of their anthelmintic, antifungal, hypoglycemic, antitumor, and antimicrobial properties (Mabberley, 2008; Israili et al., 2009). Plants of the genus *Ajuga* produce a variety of biological active secondary meta-