

Study on chemical constituents of the roots of *Ferula szowitsiana* DC and evaluation of their antioxidant activity

S. Talat gooshchi^{1,*}, H. Nazemiyeh², M. Dalirrad³, M. Bahmani³,

¹Food and Drug Organization, Urmia University of Medical Sciences, Iran

²Faculty of Pharmacy, Tabriz University of Medical Sciences, Iran

³Food and Beverages Safety Reserch Center, Urmia University of Medical Sciences, Iran

Background and Aims: *Ferula szowitsiana* DC widely grows in Turkey, Iran and Afghanistan. The plant has been used as an antihelminic and antiseptic in traditional medicine of Azarbaijan. This study is determination of chemical constituents of the roots of *F.szowitsiana* that growth in Marni lands of East Azarbaijan and assessment of their antioxidant activity.

Methods: The powdered roots of *F.szowitsiana* (300g) were soxhlet extracted successively with n-hexane, dichloromethane and methanol. The n-hexane extract (2g) was subject to vacuum liquid chromatography on silica gel using a step gradient of n-hexane:ethyl acetate (100:0, 99:1, 98:2, 97:3 96:4, 95:5, 94:6, 93:7, 92:8, 91:9, 90:10, 80:20, 60:40, 40:60, 20:80, 0:100). Yielded fractions were checked on Thin Layer Chromatography, n-hexane/ethyl acetate as developing solvent. The methanolic extract (2g×3) was fractioned with Solid Phase Extraction method by using Sep-Pak (Octa Decyl Silica) and a step gradient of methanol in water (20:80, 40:60, 60:40, 80:20, 100:0). The resulting fractions were analysed by preparative reversed-phase High Performance Liquid Chromatography. The structures of the purified compounds were determined by ¹H-NMR (Nuclear Magnetic Resonance) and ¹³C-NMR spectra. Antioxidant activity of n-hexan, dichloromethane and methanolic extracts were evaluated by 2,2-Diphenyl para-1-Picryl Hydrazyl (DPPH) method.

Results: The preparative reversed-phase HPLC analysis of the 20%, 40% and 80% methanolic fractions resulted in numerous pure compounds, which structure of 5 of them determined by ¹H-NMR, ¹³C-NMR and Ultra Violet spectroscopy as: Umbelliferon-7-apiosyl β (16) glucoside, P-hydroxy phenylethanoid glucoside, Galbanic acid, Umbelliferon β-D [6' (ferolye)-glucoside] and Umbelliferon. The methanolic extract has shown significant antioxidant activity (8.85 ×10⁻² mg/ml) in the DPPH model, which was comparable with rutin (5.12 × 10⁻² mg/ml).

Conclusions: This study shows that *F.szowitsiana* is a reach source of coumarin and furanocoumarin derivatives. The methanolic extract showed remarkable antioxidant effects and it seems that the isolated compounds may pose potent antioxidant property.

Keywords: *Ferula szowitsiana* DC; Coumarin; Antioxidant; Galbanic acid