CARNOSOL FROM *SALVIA EREMOPHILA BOISS*

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ABSTRACT

Carnosol was isolated from the aerial parts of *Salvia eremophila Boiss* and full assignments of ^{1}H and ^{13}C-NMR spectral data are presented.

Keyword: *Salvia eremophila Boiss*, Carnosol, ^{1}H and ^{13}CNMR

INTRODUCTION

There are some 500 species of the genus Salvia a member of the *Labiatae* family, which are extensively distributed throughout the world. Since ancient times, many species of this genus have aroused interest and have been used frequently for medicinal purposes (1). In connection with our studies on Iranian endemic *Salvia* species (2,3), we have now examined the aerial parts of *S. eremophila Boiss* an Iranian endemic species which has not been investigated previously.

MATERIALS AND METHODS

Instruments: ^{1}H, ^{13}C and 2D NMR experiments were performed on Bruker AMX-500 (pyridine-d_5) and Bruker ARX-400 ($CDCl_3$) instruments. HRMS was recorded in the Department of Chemistry, University of Giessen, Germany.

Plant materials: The aerial parts of *Salvia eremophila Boiss*, were collected from the road of Kashan- Ghamsar, Iran (height 1100 m) in May 1998, and identified by Dr. G.R. Amin. A voucher specimen is deposited at the herbarium of the Faculty of Pharmacy, Tehran University of Medical sciences.

Extraction and isolation: The air-dried aerial parts of *S. eremophila* were pulverized and extracted with acetone at room temperature for 3 days. The extract was evaporated to dryness and the residue triturated with MeOH to remove waxy compounds. The MeOH soluble portion was fractionated by column chromatography (Kieselgel 60, 70-230 mesh) and eluted with increasing polarity of petroleum-EtOAc. Further column chromatography (silica gel, EtOAc, MeOH) of the medium polar fractions afforded Carnosol (218mg, 0.04%) as color-less; m.p. 236-237°C; needles ($CHCl_3$-Et_2O) IR λ_{max} 3500-3200 (OH), 2961, 1715 (γ-lactone), 1461, 1316, 1200, 1030, 923 cm^{-1}; ^{1}H and ^{13}C-NMR (table 1).

RESULTS AND DISCUSSION

Extraction of the aerial parts of *Salvia eremophila Boiss* followed by column chromatography of the medium polar fractions, yielded a crystalline main constituent compound 1 (0.04%). HRMS of 1 exhibited the molecular mass at 330.182 which corresponds to the molecular formula $C_{20}H_{26}O_4$. ^{13}C-NMR data (APT and DEPT, displayed four methyl, four methylene, four methine and eight quaternary carbon). The IR spectrum displayed 2 hydroxy groups at 3492, 3276 cm^{-1}, indicating the possible presence of a γ-lactone. The NMR spectral data, in particular ^{1}H-^{1}H COSY and ^{1}H-^{13}C COSY, 2D NMR experiments led to the assignment of the diterpenoid constitution 1 for this compound. A similar substance named Carnosol has been isolated from other *Salvia* species such as; *S. Coronosa, S. Triloba, S. Officinalis, S. Santolinifolia* (4). However, the use of more sophisticated NMR techniques, allowed the allocation of all protons and carbons of 1 (table 1).

To the best of our knowledge this is the fourth report on the occurrence of Carnosol in *Salvia* species.

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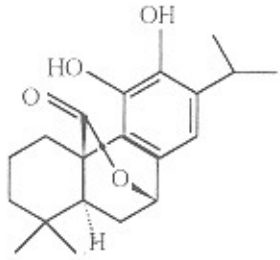

Compound 1

Table 1. ^{1}H and ^{13}C-NMR Spectral Data of 1

	^{1}H		^{13}C(pyridine-d_5)
Position	pyridine-d_5	chloroform-d	
1	3.25 dt, 3.63 brd	2.4 dt, 2.9 dt	30.07
2	1.84 m, 2.43 m	1.67 m, 2.02 tq	19.6
3	1.42 brt, 1.62 brd	1.31 dt, 1.55 brd	41.34
4			34.72
5	1.84 m	1.73 t	45.85
6	1.95 brt, 2.37 dt	1.89 brt, 2.2 m	30.29
7	5.77 brt	5.35 s	78.23
8			132.6
9			123.8
10			49.16
11			145.39
12			145.31
13			135.46
14	7.08 s	6.65 s	112.04
15	3.9 m	3.10 m	27.6
16	1.48 d	1.23 d	23.18
17	1.53 d	1.26 d	23.3
18	1.17 s	0.95 s	31.79
19	0.94 s	0.89 s	19.95
20			176.57

J (Hz): $J_{1\alpha,1\beta}$=13.8; J $J_{2\alpha,2\beta}$ =13.5; J $J_{3\alpha,3\beta}$ =12.9; J $J_{6\alpha,6\beta}$ =13.10

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