Journal of Plant Biochemistry & Physiology
ISSN: 2329-9029

Mammadova et al., J Plant Biochem Physiol 2018, 6:1
DOI: 10.4172/2329-9029.1000208

Research Article Open Access

Investigation of the Biologically Active Substances Obtained from *Johrenia paucijuga* (DC) of the Species Bornm

Mammadova HG*, Serkerov SV and Alasgarova AN

Sumgayit State University, Sumgayit, Azerbaijan

Abstract

Johrenia paucijuga species belongs to the genus Umbelliferae. 187 species of the genus Umbelliferae concentrated in 76 families were widespread in Azerbaijan flora beginning from the plain to the upper mountain zone. Representatives of this family are perennial, biennial and annual herbs, rarely shrubs, bushes and small trees. During long period this plant were used as herbal plants between rural areas of Caucasian region with purpose treatment different type of health problems. Research aimed to identify this plant and analyse chemical component for pharmacologically valuable activities, which can be employed for therapeutic purposes.

Keywords: Umbelliferae; *Johrenia paucijuga*; β-stigmasterol; β-sitosterol

Introduction

Among known the biologically active substances of plant, α-, β- and γ-pirons are very important and have physiological activities in various directions. They are the basis for the different drugs, which using the practice medicine as spasmolytic, anticoagulant, expanding capillaries, hypotensive, anticarcinogen, anti-inflammatory, bile repellent and etc. From ammifurin, psoralen, beroxanum, meladinine, methoxsalen, visnadin, dihydrosamidin, atamantin and pterixin that is widely used in medicine for treatment leucoderma, vitiligo. Various derivatives of 4-Oxycoumarin are the basis for the drugs dicoumarol and pelentan having anticoagulant effects. The substance 4.7-dioxy-3-amino-8-metylcoumarin obtained from 4.7-dioxy-3-amino-8-metylcoumarin *Sreptomyces spheroids* is highly active against the microorganisms and is a base for the antibiotic drug "novobiosin" [1,2].

Methods

The mix of extractive substances was obtained by finely cutting the body of *Johrenia paucijuga*, then drying in the room conditions (300 g) and extracting by acetone 3 times (3 days for each time). To obtain the extractive substances the mix was chromagraphed by the chromatography method in the glass column filled by Al_2O_3. The obtained substances were compared based on the ^1H and ^{13}C NMR information provided in literature on the structure of the individual items.

It was identified 6350 higher plants, including 2500 regional endemic species in Caucasian flora [3]. About 900 medicinally important plants, 850 species with essential oil, 200 plants with rubber, 200 with vaccinations ingredients, 460 colored, 600 with alhoids, more than 400 plants with vitamins are known in Azerbaijan flora [4].

Medicinal plants are very important for human health and its strengthening. The drugs produced from these plants do not lead to dependence. More than 50% of the drugs used in the world are of vegetable origin. *Johrenia paucijuga* species belongs to the genus Umbelliferae. About 400 species and 3500 families are known in the temperate and subtropical regions of the Northern Hemisphere of the Earth [5].

The family of Umbelliferae are noticeably plants. They play a major role in the formation of vegetation and give the unique charms to the landscapes. Representatives of this family are perennial, biennial and annual herbs, rarely shrubs, bushes and small trees [6-8].

Bodies of them are usually empty, often make a good progress. Presence of the secretoranbars in all parts is very specific. *Johrenia paucijuga* blossoms in June in the western region of Azerbaijan (Gedebey region). For now, no research is available on the biological advantages of this family and its biochemistry. Current research is devoted to study the chemical composition of *Johrenia paucijuga*.

Experiment

The research materials and methods

As an object of study is taken the body of the *Johrenia paucijuga* in the flowering phase (end of June) in the Gadabey region of Azerbaijan. The substance was obtained by finely cutting of the *Johrenia paucijuga* body, then drying in the room conditions (300 g) and extracting by acetone 3 times (3 days for each time). Column chromatography method was used to get the individual items. Thus, the sum of 10 g ingredients was chromatographed in the glass column (h=60.0; d=2.5 cm) filled with Al_2O_3 (neutral, with III-IV degrees of activity). The volume of each fraction was taken 100 ml. The column chromatography was eluated by Hexane (36 fractions), hexane+benzolla (43 fractions), benzolla (41 fractions), benzolla+xloroforumla (28 fractions), xloroforumla (5 fractions) and xloroforum+alcohol (95: 5) [9].

The individuality of the substances was defined using thin layer chromatography method (Silufol UV 254, solvent-benzol+xloroforum 1:1), the melting temprature on the Boytius table.

IR-spectrums were drawn in the UR-20 spectrometer on the vaseline oil.

^1H, ^{13}C, ^{13}C Dept 135, Dept 90 spectrums were registered in the Bruker 300 MHz spectrometer for the isotope ^1H with frequency 300

***Corresponding author:** Mammadova HG, Sumgayit State University, Sumgayit, Azerbaijan, Tel: +994186448901; E-mail: husniya.mammadova@mail.ru

Received January 09, 2018; **Accepted** February 07, 2018; **Published** February 18, 2018

Citation: Mammadova HG, Serkerov SV, Alasgarova AN (2018) Investigation of the Biologically Active Substances Obtained from *Johrenia paucijuga* (DC) of the Species Bornm. J Plant Biochem Physiol 6: 208. doi: 10.4172/2329-9029.1000208

MHz and for the ^{13}C isotope with 75 MHz frequency using DMSO-d_6 as a solvent. Chemical replacements are given in the S-scale (internal standard-TMS).

Results and Discussion

Two individual substances were obtained from the plant material mix using chromatography method. The characterizations of the β-sitosterol and β-stigmasterol were defined on the basis of discovering the IR and NMR spectrums of the substances. The substance was obtained from the 73-75-th fractions by deluation by the (2:1) mixture of the chromatographic column. The NMR data of β-sitosterol (a) and β-stigmasterol (b) are presented in Tables 1 and 2.

The isolated compounds were identified as β-sitosterol and β-stigmasterol. The two formers are phytosterol with chemical structure similar to cholesterol. They reduce blood levels of cholesterol and are sometimes used in treating hypercholesterolemia. β-stigmasterol may be useful in prevention of certain cancers, including ovarian, prostate, breast and colon cancers [10-13].

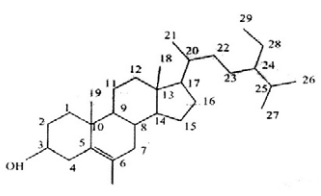
(a)	
^{1}H NMR	**^{13}C NMR**
1	37.23
2	31.6
3 3.52 (m, 1H)	71.83
4	42.26
5	140.72
6 5.34 (s, 1H)	121.74
7	31.8
8	31.8
9	50.11
10	36.15
11	21.07
12	39.26
13	42.26
14	56.75
15	24.30
16	28.25
17	56.03
18 0,68 (s, 3H)	11.86
19 1.01 (s, 3H)	19.40
20 0,92 (d, J=6.5 HZ, 3H)	35.88
21	18.25
22	33.80
23	26.02
24	45.81
25	29.11
26 0.83 (m, 3H)	19.83
27 0.84 (m, 3H)	19.02
28 0,84 (m, 2H)	23.04
29 0,84 (m, 3H)	11.98
1. beta-sitosterol	

Table 1: ^{1}H NMR and ^{13}C NMR chemical shift values for β-sitosterol (a) recorded in $CDCl_3$.

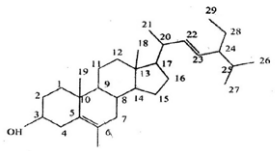
(b)	
^{1}H NMR	**^{13}C NMR**
1	37.23
2	31.6
3 3.51 (tdd, 1H, J=4.5, 4.2 and 3.8Hz)	71.83
4	42.26
5 31 (t, 1h, J=6.1 Hz)	140.72
6	121.74
7	31.8
8	31.8
9	50.11
10	36.15
11	21.07
12	39.66
13	42.26
14	56.85
15	24.36
16	28.24
17	55.93
18 0.71 (s, 3H)	12.04
19 1.03 (s, 3H)	19.40
20	40.52
21 0.91 (d, 3H, J=6.2 Hz)	21.21
22 4,98 (m, 1H)	138..33
23 5,14 (m, 1H)	129.25
24	51.24
25	31.8
26 0,82 (d, 3H, J=6.6 Hz)	19.07
27 0.80 (d, 3H, J=6.6 Hz)	18.77
28	25.42
29 0.83 (t, 3H, J=7,1 Hz)	12.26
2.beta-stigmasterol	

Table 2: ^{1}H NMR and ^{13}C NMR chemical shift values for β-stigmasterol (b) recorded in $CDCl_3$.

Further research is recommended for isolation of other phytochemicals and also investigation of pharmacological and biological properties.

Conclusion

Two individual substances were obtained from the plant material mix using chromatography method. The characterizations of the β-sitosterol and β-stigmasterol were defined on the basis of discovering the IR and NMR spectrums of the substances. The isolated compaunds were identified as β-sitosterol and β-stigmasterol. The two formers are phytosterol with chemical structure similar to cholesterol. They reduce blood levels of cholesterol and are sometimes used in treating hypercholesterolemia. β-stigmasterolmay be useful in prevention of certain cancers, including ovarian, prostate, breast and colon cancers.

References

1. Kuznetsova GA (1967) Natural Coumarins and Fumokumarins L. Nauka, p: 248.
2. Pimnov MG (1971) The List of Sources of Plant Coumarin Compounds L. Nauka, p: 200.

3. Ali-Zade V (2014) Proceedings of the Institute of Botany. Azerbaijan National Academy of Sciences, Baku, pp: 3-7.
4. Hajiyev VS, Musayev SN (1996) The plant formations recommended to the Red and Green Books of Azerbaijan, Baku, Elm, pp: 3-4.
5. Gurbanov E (2009) Higher Plant Systematics. Baku, pp: 293-299.
6. Gasimova GG, Serkerov SV (2012) Peucedanum Ruthenicum Bieb/The roots of the new coumarin derivatives. Proceedings of the Institute of Botany, Azerbaijan National Academy of Sciences, Baku, XXXII.
7. Tanker N, Koyuncu M, Coşkun M (2007) Farmasötik botanik. Ankara, p: 434.
8. Bolmann F, Bhaskar Rao VS, Grenz M (1968) Uber die Coumarine aus Angelica ursina and Seseli libanotis. Tetrahedron Letters 36: 3946.
9. Heftmann E (1963) Biochemistry of plant steroids. Annual Review of Plant Physiology 14: 225-248.
10. Werner JM (1987) Chemical and biological aspects of brassinolide. Ecology and Metabolism of Plant Lipids 5: 53-75.
11. Lassak EV, Southwell LA (1972) The coumarins from the resin of Euodia vitiflora. Aust J Chem 25: 249.
12. Edible Medicinal and Non-Medicinal Plants (2015) Modified Stems, Roots, Bulbs, Amerika, Volume 9.
13. Lemmich J, Lemmich E, Nielson BE (1966) Constituents of Umbelliferous plants. VIII. Coumarins from the root of Seseli Libanotis (L.) Koch. The structure of new coumarins. Acta Chem Scand 20: 2497.