International Journal of PharmTech Research
CODEN (USA): IJPRIF ISSN : 0974-4304
Vol.3, No.4, pp 2245-2248, Oct-Dec 2011

GC/MS Chemical Analysis of Pistashia lentiscus fatty oil from the north of Tunisia

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Abstract: The Pistacia lentiscus fatty oil is used in north of Tunisia as oral medicinal product for the treatment of gastric ulcer. Its chemical analysis of by GC/MS, showed that it contains some substances among others, which were used as additive in medical and pharmaceutical fields. The fatty oils of Pistacia lentiscus fruit is comprising the palmitic acid, linoleic acid 3-undecylphenol, 3-formyl-1,3-cyclohexadiene, 3-pentadecylphenol and 2,6,10,14,18,22-tetracosahexane. For examining their potential biologic activity further studies are necessary.

Keywords: *Pistacia lentiscus, Fatty oil, Anti-gastric ulcer, Healing, GC/MS.*

Introduction

The Pistacia lentiscus is an Anacardiaceae's derivative tree. This evergreen tree is a characteristic of the degraded areas of the Mediterranean forest (Tunisia, Provence, Morocco, Algeria and Corsa...). In Tunisia, this tree grows in Tabarka, Ain Draham and Sajnen. It is known under the name of "Dharou" and its fruit is called "Gadhoum".[1, 2]

The tree can reach three meters in height, with leaves measuring from 2 to 4 cm. The flowering season is March to May. Almost completely dried, fruits are measuring about 5 mm. First red then black color at maturity, the fruit are harvested in October and November.

The growth of the studies of natural substances is explained by the diversity of their different fields of application (medicinal[3], pharmaceutical[4]). Because of their potential biological bacterial activities, this plant was subjected to different interesting studies.[5-13]

This F. O. is ten times more expensive than olive oil, slightly viscous, yellowish color, forestry and pleasant odor. Its empirical frequent use as an oral medicinal product in rural and even in urban areas in the north of Tunisia as treatment of gastric ulcer, encouraged us to study its chemical composition.

This work is a contribution in the study of the chemical composition of F. O in the field of natural substances.

To identify its components the gas chromatography coupled to mass spectrometry (GC/MS) in electronic ionization (EI) mode is used as a technic.

Table I: Retention time and chemical composition of Pistacia lentiscus F. O.

n	Compounds	Rt (min)	(%)
1	Palmitic acid	5,536	15.64
2	Linoleic acid	6,421	47.02
3	1-Formyl-1,3-cyclohexadiene	6,840	2.70
4	3-Pentadecylphenol	7,667-7.673	14.11
5	3-Undecylphenol	8.372	18.86
6	2,6,10,14,18,22-Tetracosahexane	8,937	1.67

Results and discussion

The GC/MS study of the Pistacia lentiscus F. O gave the mass spectra of six compounds: (1) palmitic acid, (2) linoleic acid, (3) 3-undecylphenol, (4) 1-formyl-1,3-cyclohexadiene, (5) 3-pentadecylphenol and (6) 2,6,10,14,18,22-tetracosahexane.
The retention times and relative percentages are summarized in Table **I**.

The corresponding mass spectra allowed us to identify the detected molecules from their literature reviews. It comes out as :

1. The Palmitic acid: is an intermediate in biosynthesis of sexual pheromones of some insects as "Tegenaria Atrica.[14] It is used in the preparation of the ingredients of some drugs (Survanta, Multivitamin (UPSA), Renutryl, Fungisone, Penticort)[15] and to decrease the hydrophobicity of virginiamycin, a drug used Against Mycobacterium avium.[16]

***2. The Linoleic acid*:** is an unsaturated fatty acid (Omega 6), vital, involved in lipid metabolism and maintaining the integrity of the integuments.[17] It is a precursor for the synthesis of prostaglandins, which block the production of gastric acid.[18] It is used in combination with (vitamin E) against eczema and dermatitis.[19] Furthermore, it is used as excipient for some drugs such as demangeaison, aphilan, fongamil.

***3. The 1-formyl-1 ,3-cyclohexadiene*:** is described as an intermediate for the synthesis of cyclic compounds by Diels-Alder[20] and reactions photodecarbonylation.[21]

4. The 3-pentadecylphenol: is isolated, identified and used in the synthesis of liquid crystals polymers and Langmuir-Blodgett multilayers.[22-27]

5. The 3-undecylphenol: recently isolated from the "sumartan rainforest plant",[27] identified and then synthesized. It shows a very high reactivity antinematodale.[20]

6. The 2,6,10,14,18,22-tétracosahexane: is a polyunsaturated hydrocarbon, used in the preparations of adjuvants for vaccines.[28]

Conclusion

In the analytical study, described above, we have identified, the major constituents of the Pistacia lentiscus fatty oils. As well as the other natural substance compositions, it may vary according to the location and the time of harvest. Some of the detected molecules, were described as active ingredient of drugs, as drugs excipient and as adjuvant for vaccines. A biological activity comprehensive study is required to justify its medical uses.

Experimental section

a- Origin: The fruit of the Pistacia lentiscus tree are harvested from Tabarka (extreme north-west of Tunisia), washed with water, pressed and its oil was injected.

b- Equipment: The system used was a HP6890 Series GC device, carrier gas N 55 coupled to a mass spectrometer type 5976 Mass Selective Detector with automatic injector H9 96890, associated with HP Chemstation software on Windows environment.

c-Injection conditions: The injections were performed in a column of HP-branded 1909 1A-002 type ultra1, methylsiloxane of length 25 m, inner diameter 0.20 mm and film thickness of 1.1 microns.

The carrier gas was helium with a flow rate of 1 mm/min under a pressure of 128.82 psi.

The injection mode was split. The injection volume is 3 µL injection at a temperature of 250 °C, the split ratio is 1/10 of 3 µL.

Oven temperature program: initial temperature 120 °C, initial time 0 min.

Slope 1: 20 °C/min, final temperature 1: 300 °C

Slope 2: 10 °C/min, final temperature 320 °C and final time: 5 min.

Parameters of the mass spectrometer: Ionization mode (EI 70 eV); SCAN acquisition mode; interface temperature 280 °C; the quadrupole temperature is 150 °C, multiplier 2035 V and the source temperature is 230 °C.

Acknowledgements

The author wish to thank Professor A. BAKLOUTI, Dr. S. BOUEBDELLAH and Dr B. MELLAH, for their technical assistance.

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