

GC-MS ANALYSIS OF ETHANOL EXTRACT FROM THE AERIAL PARTS OF FAGONIA LONGISPINA (FAMILY ZYGOPHYLLACEAE)

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ABSTRACT

Chemical constituents of different extracts of Fagonia Longispina Family (Zygophyllaceae) were identified by gas chromatography-mass spectrometry and their relative concentrations were determined. Fagonia Longispina extract contained 13 compounds: : Ethyl Palmitate (26.71%), 9,12Octadecadienoic acid, ethyl ester(16.03 %), 9,12,15 Octadecatrienoic acid,ethyl ester(z,z,z) (57.25%) , Phenol2,6-bis (1,1-dimethylethyl)-4-methyl- (27.21%) , N-hexadecanoic acid(12.24%), Tridecanoicacid (9.25%), 9,12-Octadecadienoicacid(z,z) ,methylester (8.16%), 11,14,17 – Elcosatrienoicacid,methyl ester (34.69%) , Decanoic acid (12.24) , 9-Elcosene,(E) (15.62%) , Cyclotetracosane (03.75%), 1-Heptadecene (23.12%), 1-Nonadecene (06.25%).

Keywords: Ethanol extract, GC-MS, antioxidant, Fagonia longispina.

INTRODUCTION

South Algeria with its rich floral resources and ethnobotanical history is an ideal place to screen plants for biological activity and as a source of new pharmacological compounds. *Fagonia longispina* . (family Zygophyllaceae) is a small spiny shrub widely distributed in the south west of Algeria and South east of Morocco^{1,2}. Plants belonging to the genus *Fagonia* are often used in folk medicine, mainly as a popular remedy for the treatment of various skin lesions. Additionally, the aerial part of the plant is claimed to be a remedy for cancer in its early stages^{3,4} and for the treatment of various other diseases of digestive and blood vascular system. The medicinal properties of the plant were attributed due to its variety of active phytochemical constituents^{5, 6}. Although the plant had received a great interest for the phytochemical investigation since many years, various *Fagonia* species were investigated mainly for the presence of major types of phytochemical compounds. Hence the objective of the present study is to identify the Phytochemical constituents of the ethanolic extracts of *Fagonia Longispina* with the aid of GC-MS technique.

MATERIALS AND METHODS

Plant Material

Aerial parts of *Fagonia longispina* were collected in march 2010 from boukais (South Western Algeria) Algeria, and identified by the National Agency of Nature Protection (ANN), Bechar, Algeria .

Preparation of the Extracts

The dried powder (100g) of the aerial parts of *Fagonia lonjispina* was extracted exhaustively with 60% EtOH. The extract was concentrated, diluted with water and partitioned with hexane, ethyl ether and Chloroform. The residue of the hexane extract (2g), of the ethyl ether extract (1.4g) and of the CHCl₃ extract (1.6g) were performed using a gas chromatograph-mass spectrograph (GC-MS).

Gas Chromatography Mass Spectrometry Analysis

GC-MS analysis was performed with GC Clarus 500 Perkin Elmer equipment. Compounds were separated on Elite-1 capillary column (100% Dimethylpolysiloxane). Oven temperature was programmed as follows: isothermal temperature at 100°C for 1 min, then increased to 220°C at the rate of 10°C/min, then increased up to 260°C at the rate of 5°C/min held for 9 min. Ionization of the sample components was performed in the EI mode (70 eV). The carrier gas was helium (1ml/min) and the sample injected was 2 µl. The detector was Mass detector turbo mass gold-Perkin Elmer. The total running time for GC was 28 min and software used was Turbo mass 5.2. The individual constituents were identified by comparing their mass spectra with the spectra of known compounds stored in the spectral database, NBS, WILEY and NIST attached to the GC-MS instrument and reported.

RESULTS AND DISCUSSION

GC-MS analysis of the phytochemicals present in different extracts (hexane, ethyl ether and Chloroform) of *Fagonia lonjispina* clearly showed the presence of thirty three compounds.

The active principles with their retention time (RT), molecular formula, molecular weight (MW), and relative percentages (peak areas %) are presented in tables 1, 2, and 3.

The GC-MS chromatograms of hexane, ethyl ether and chloroform extracts are shown in Figure-1, 2 and 3 respectively.

Three compounds were identified in the hexane fraction, representing approximately 99% of the total mass of the extract (table 1). 9.12.15 octadecatrienoic acid, ethyl ester (z,z,z) (57.25%) and ethyl palmitate (26.71%) were found to be the most abundant in the hexane extract.

A total of 13 compounds were found in the ethyl ether extract, and six were identified (table 2) representing 77.53% of the total mass. The major chemical constituents in the ethyl ether fraction were the 11, 14, 17 -Eicosatrienoic acid, methyl ester (34.69%) and Phenol 2, 6-bis (1, 1-dimethylethyl)-4-methyl (27.21%).

GC-MS chromatogram of the chloroform extract showed seventeen distinct peaks, while the compounds identified are listed in (table 3).

Four compounds were identified in the chloroform fraction, representing 48.74% of the total mass of extract and the major compound was 1-heptadecene (23.12%).

It has been reported that secondary metabolites exert a wide range of biological activities on physiological systems. Praveen Kumarm.P et al.(2010)⁷ reported the activities of 9.12.15 octadecatrienoic acid, ethyl ester (z,z,z), ethyl palmitate and N-hexadecanoic acid as Anti-inflammatory, hypocholesterolemic cancer preventive, hepatoprotective, Antioxidant and hypocholesterolemic. It is therefore not unlikely that these phytochemicals found in *F. lonjispina* are responsible of the traditional applications of this medicinal plant.

CONCLUSION

The analysis of the phytochemicals in the hexane, ethyl ether and chloroform extracts of *Fagonia lonjispina* aerial parts revealed 13 compounds namely: Ethyl Palmitate (26.71%), 9,12-Octadecadienoic acid, ethyl ester(16.03 %), 9,12,15 Octadecatrienoic acid,ethyl ester(z,z,z) (57.25%) , Phenol2,6-bis (1,1-dimethylethyl)-4-methyl- (27.21%) , N-hexadecanoic acid(12.24%), Tridecanoicacid (9.25%), 9,12-Octadecadienoicacid(z,z) ,methylester (8.16%), 11,14,17 –Elcosatrienoicacid,methyl ester (34.69%) , Decanoic acid (12.24) , 9-Elcosene,(E) (15.62%) , Cyclotetracosane (03.75%), 1-Heptadecene (23.12%), 1-Nonadecene (06.25%) .

These compounds are probably the major players in the antioxidant responses evoked by the plant. Further studies are needed to be conducted to understand the structural features of the compounds predicted from the phytochemical analysis.

Table 1: Components detected in the hexane extract of *Fagonia lonjispina*

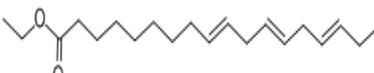
SI .No	RT	Name of Compound	Molecular Formula	Molecular weight	Peak Area %	Structures
1	36.55	Ethyl palmitate	C ₁₈ H ₃₆ O ₂	284	26.71	
2	40.38	9,12-Octadecadienoic acid, ethyl ester	C ₂₀ H ₃₆ O ₂	308	16.03	
3	40.57	9,12,15 Octadecatrienoic acid,ethyl ester(z,z,z)	C ₂₀ H ₃₄ O ₂	306	57.25	

Table 2: Components detected in the ethyl ether extract of *Fagonia lonjispina*

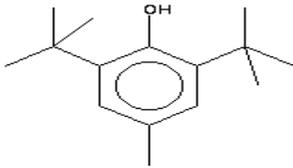
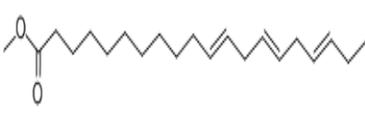
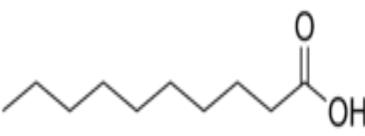
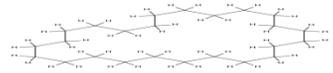
Sl .No	RT	Name of Compound	Molecular Formula	Molecular weight	Peak Area %	Structures
4	23.84	Phenol 2,6-bis (1,1-dimethylethyl)-4-methyl-(cas) (Butylated Hydroxytoluene)	C ₁₅ H ₂₄ O	220	27.21	
5	35.87	N-hexadecanoic acid	C ₁₆ H ₃₂ O ₂	256	12.24	
6	36.53	tridecanoic acid (cas)	C ₁₃ H ₂₆ O ₂	214	09.25	
7	40.37	9,12-octadecadienoic acid (z, z), methylester	C ₁₉ H ₃₄ O ₂	294	08.16	
8	40.53	11, 14,17 - Eicosatrienoic acid, methyl ester (cas)	C ₁₈ H ₃₆ O ₂	320	34.69	
9	29.13	decanoic acid (cas)	C ₁₀ H ₂₀ O ₂	172	12.24	

Table 3: Components detected in the chloroform extract of *Fagonia lonjispina*

Sl .No	RT	Name of Compound	Molecular Formula	Molecular weight	Peak Area %	Structures
10	29.14	9-eicosene , (e) -(cas)	C ₂₀ H ₄₀	280	15.62	
11	23.84	Cyclotetra Cosane -(cas)	C ₂₄ H ₄₈	336	03.75	
12	36.47	1-heptadecene	C ₁₇ H ₃₄	238	23.12	
13	37.21	1-nonadecene(cas)	C ₁₉ H ₃₈	266	06.25	

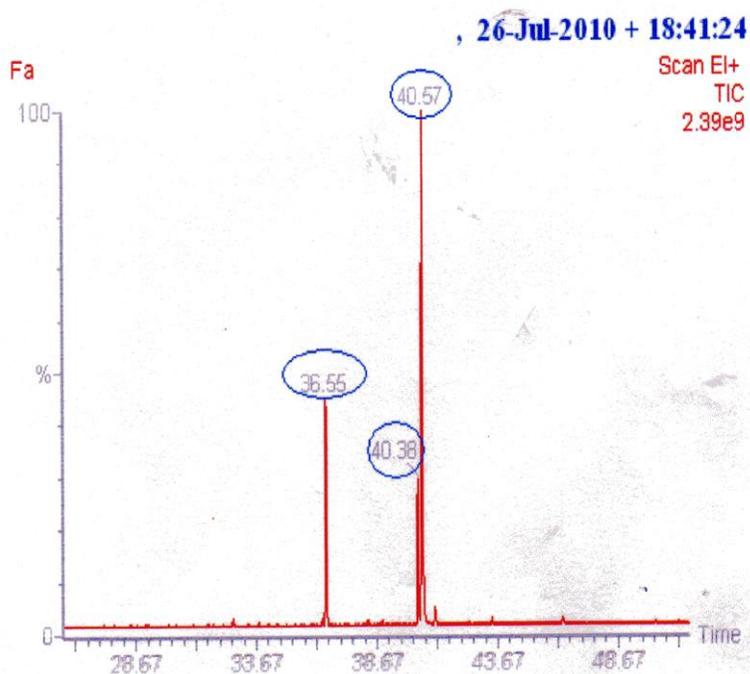


Figure 1: GC-MS Chromatogram of the hexane extract of the aerial parts of *Fagonia lonjispina*

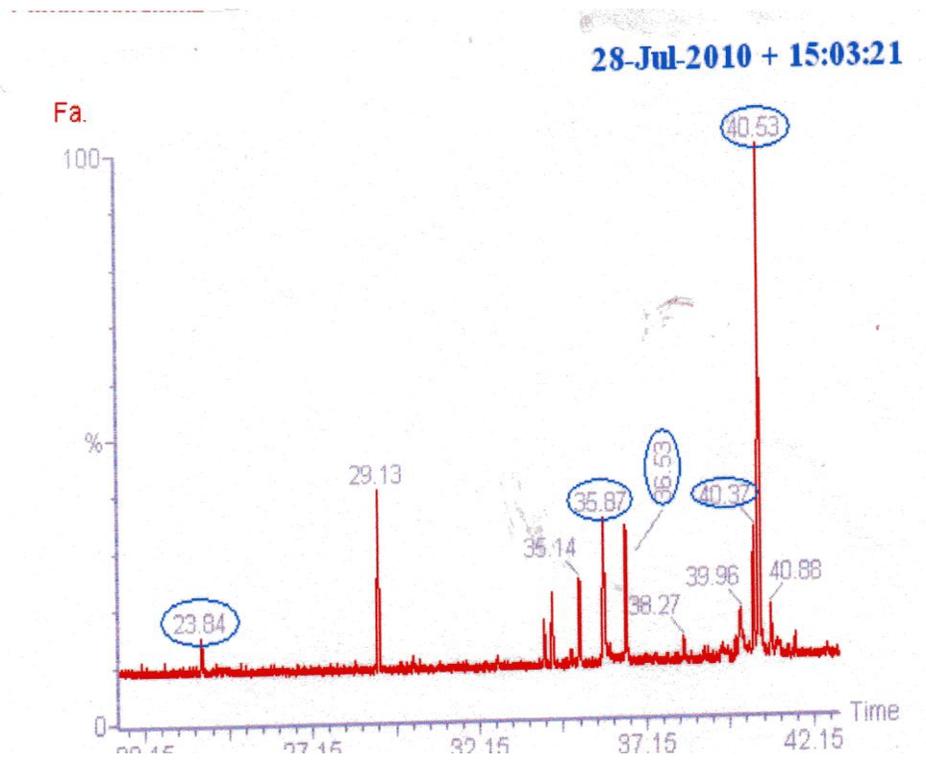


Figure 2: GC-MS Chromatogram of the ethyl ether extract of the aerial parts of *Fagonia lonjispina*

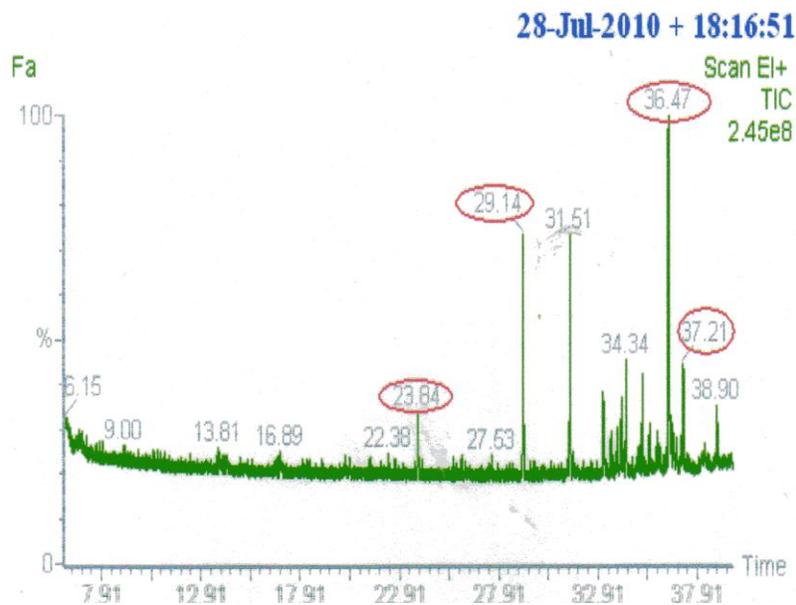


Figure 3: GC-MS Chromatogram of the Chloroform extract of the aerial parts of *Fagonia lonjispina*

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