

CHEMICAL CHARACTERIZATION BY GC-MS FROM THE AERIAL PARTS OF *FAGONIA LONGISPINA* (ZYGOPHYLLACEAE)

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ABSTRACT

Objective: The objective was to characterize the phytochemical constituents in ethyl acetate (EtOAc) extract from the aerial parts of *Fagonia longispina* (Zygophyllaceae) by gas chromatography-mass spectrometry (GC-MS).

Methods: The dried powder of the aerial parts of *F. longispina* was extracted exhaustively with ethanol. The extract was concentrated, diluted with water and partitioned with EtOAc. The residue of the EtOAc extract was performed using a GC-MS.

Results: Chemical constituents of the EtOAc extract of *F. Longispina* Family (Zygophyllaceae) were identified by GC-MS and their relative concentrations were determined. *F. Longispina* extract contained 12 compounds: Cis-4-(4'-T-butylcyclohexyl)-4-methyl-2-pentanone (33.33%), 4beta-(tert-butyl)-1alpha-(1methylvinyl) cyclohexanem ethanol (09.52%), cyclohexyl-2-methylene butanyl ketone (14.28%), trans-4-(t-butylcyclohexyl)-4-methyl-2-pentanone (9.52%), 2,6,10-trimethyl, 14-Ethylne-14 pentadecene (6.66%), 2-decen-1-ol (cas) (4.76%), 3,7,11,15-tetramethyl-2-hexadecen-1-ol (2.85%), 2-nonen-1-ol (4.76%), citronellyl acetate (2.85%), tetratetracontane (3.38%), hexatriacontane (cas) (3.38%), and phytolacetate (4.76%).

Conclusions: This GC-MS study helps to predict the formula and structure of phytoconstituents which can be used as drugs, and further investigation may leads to the development of drug formulation. These compounds are probably the major players in the antioxidant responses evoked by the plant.

Keywords: Ethyl acetate extract, Gas chromatography-mass spectrometry analysis, *Fagonia longispina*.

INTRODUCTION

South Algeria with its rich floral resources and ethnobotanical history is an ideal place to investigate plants for their 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 Southeast 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. In addition, 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 *F. longispina* with the aid of GC-MS technique.

METHODS

Collection

Aerial parts of *F. longispina* were collected in March 2010 from boukais (South Western Algeria) Algeria, and identified by the National Agency of Nature Protection (ANN), Bechar, Algeria [7-9].

Preparation of the extracts

The dried powder (100 g) of the aerial parts of *F. longispina* was extracted exhaustively with 60% EtOH. The extract was concentrated, diluted with water and partitioned with EtOAc. The residue of the EtOAc extract (2 g), was performed using a gas chromatograph-mass spectrograph (GC-MS) [10].

GC-MS 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: the isothermal temperature at 100°C for 1 minute, then increased to 220°C at the rate of 10°C/minutes, then increased up to 260°C at the rate of 5°C/minutes held for 9 minutes. Ionization of the sample components was performed in the EI mode (70 eV). The carrier gas was helium (1 ml/minute) for 9 minute. Ionization of the sample components was performed in the EI mode (70 eV). The carrier gas was helium (1 ml/minute) 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 minutes and software used was Turbo mass 5.2.

Identification of components

The individual constituents were identified by comparing their mass spectra with the spectra of known compounds stored in the spectral database of National Institute of Standard and Technology (NIST) attached to the GC-MS instrument and reported.

RESULTS AND DISCUSSIONS

GC-MS analysis of the phytochemicals present in the EtOAc extract of *F. longispina* clearly showed the presence of twelve compounds [11,12].

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

The GC-MS chromatogram of EtOAc extract is shown in Fig. 1.

About 12 compounds were identified in the EtOA extract, representing approximately 99% of the total mass of the extract (Table 1). Cis-4-(4'-t-butylcyclohexyl)-4-methyl-2-pentanone (33.33%), 4beta-

Table 1: Components detected in the EtOAc of *F. longispina*

S. No	RT	Name of the compound	Molecular formula	MW	Peak area %
1	29.13	Cis -4-(4'-T-butylcyclohexyl)-4-methyl-2-pentanone	C ₁₆ H ₃₀ O	238	33.33
2	32.72	4beta-(tert-butyl)-1alpha-(1-methylvinyl) cyclohexanemethanol	C ₁₄ H ₂₆ O ₂	210	9.52
3	33.77	Citronellyl acetate	C ₂₀ H ₃₆ O ₂	198	5.71
4	35.94	2-Nonen-1-ol	C ₉ H ₁₈ O	142	4.76
5	36.55	Tetratetracontane	C ₄₄ H ₉₀	618	2.85
6	38.9	3,7,11,15-tetramethyl-2-hexadecen-1-ol	C ₂₀ H ₄₀ O	296	2.85
7	40.38	Hexatriacontane (cas)	C ₃₆ H ₇₄	506	3.38
8	40.57	Phytolacetate	C ₂₂ H ₄₂ O	238	4.76
9	41.11	2-decen-1-ol (cas)	C ₁₀ H ₂₀ O	156	4.76
10	42	Cyclohexyl-2-methylenebutanylketone	C ₁₂ H ₂₀ O	180	14.28

MW: Molecular weight, *F. longispina*: *Fagonia longispina*, RT: Retention time

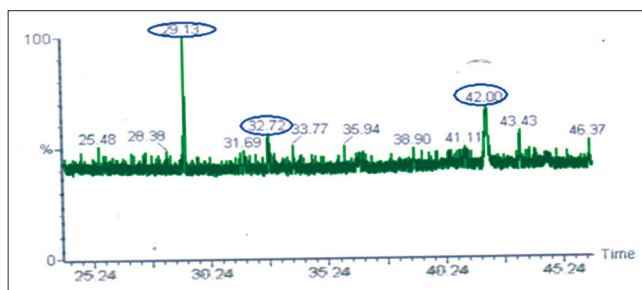


Fig. 1: Gas chromatography-mass spectrometry chromatogram of the ethyl acetate extract of the aerial parts of *Fagonia longispina*

(tert-butyl)-1alpha-(1-methylvinyl) cyclo hexanemethanol (09.52%), cyclohexyl-2-ethylene butanyl ketone (14.28%), trans-4-(4'-t-butylcyclohexyl)-4-methyl-2-pentanone (9.52%), 2,6,10-trimethyl, 14-ethylne-14-pentadecne (6.66%), 2-decen-1-ol (cas) (4.76%), 3,7,11,15-tetramethyl-2-hexadecen-1-ol (2.85%), 2-nonen-1-ol (4.76%), citronellyl acetate (2.85%), tetratetracontane (3.38%), hexatriacontane (cas) (3.38%), phytolacetate (4.76%).

It has been reported that secondary metabolites exert a wide range of biological activities on physiological systems.

Among the identified phytochemicals 3,7,11,15-tetramethyl-2-hexadecen-1-ol, cis -4-(4'-t-butylcyclohexyl)-4-methyl-2-pentanone, citronellyl acetate, tetratetracontane, and hexa triacontane both may be employed as an anti-inflammatory, hypocholesterolemic, cancer preventive, hepatoprotective, antioxidant, and hypocholesterolemic [7].

It is therefore not unlikely that these phytochemicals found in *F. longispina* are responsible of the traditional applications of this medicinal plant.

CONCLUSIONS

The analysis of the phytochemicals in the EtOAc extract of *F. longispina* aerial parts revealed 12 compounds namely: Cis-4-(4'-T-butylcyclohexyl)-4-methyl-2-pentanone (33.33%), 4beta-(tert-butyl)-1alpha-(1methylvinyl) cyclohexane methanol (09.52%), cyclohexyl-2-methylene butanyl ketone (14.28%), trans-4-(4'-T-butylcyclohexyl)-4-methyl-2-pentanone (9.52%), 2,6,10-Trimethyl,

14-ethylne-14-pentadecene (6.66%), 2-decen-1-ol (cas) (4.76%), 3,7,11,15-tetramethyl-2-hexadecen-1-ol (2.85%), 2-nonen-1-ol (4.76%), citronellyl acetate (2.85%), tetratetracontane (3.38%), hexatriacontane (cas) (3.38%), and phytolacetate (4.76%). 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.

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