



Chemical Composition of *Myrtus communis* L. (Myrtaceae) Fruits

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Authors' contributions

This work was carried out in collaboration between all authors. Authors KOQ and SAAMAS designed the study, performed sample collection and processing and wrote the first draft of the manuscript. Author TAAS wrote the protocol, managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JALSI/2017/33746

Editor(s):

(1) Ali Mohamed Elshafei Ali, National Research Centre, Egypt.

Reviewers:

(1) Dildar Ahmed, Forman Christian College, Lahore, Pakistan.

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Complete Peer review History: <http://www.sciencedomain.org/review-history/19748>

Original Research Article

Received 27th April 2017
Accepted 17th June 2017
Published 28th June 2017

ABSTRACT

The chemical composition of *Myrtus communis* L. extracts were prepared and analyzed by GC-MS. Sixteen phytochemical constituents of chemical compounds were identified in fruits of *Myrtus communis*. The relative percentage of linoleic acid methyl ester was high (27.19%), followed by oleic acid methyl ester (21.18%) and then octane 3,5- dimethyl (16.47%), dodecane (11.39%), palmitic acid methyl ester (6.80%) and tetradecane (6.69%) as well as, some components present in lower percentage such as stearic acid methyl ester (3.32%).

Keywords: *Myrtus communis*; Myrtaceae; linoleic acid; GC-MS.

1. INTRODUCTION

Myrtle (*Myrtus communis* L.) is an aromatic evergreen perennial shrub or small tree

belonging to the Myrtaceae family that includes 130-140 genera and about 3000 - 4000 species growing in temperate, tropical and subtropical regions [1-3]. It is native plant in Mediterranean

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region and Southern Europe. It grows wild in Africa, Europe and Asia including Turkey, Iraq, Iran and Syria [4-8]. *Myrtus communis* L. is an evergreen aromatic plant growing wild in Iraq and cultivated in gardens [9].

Common names for myrtle trees are "Yas" or "Habb Al-As", "Ace", "hambeles", "mersin" or "murt" [10-12]. Myrtle has upright stem, 1.8-3 m high with dark glossy green leaves that are opposite paired or whorled, glabrous, ovate to lanceolate with an entire margin. The flowers are fragrant and white or pinkish. The fruit is a round, reddish blue to violet berry [7,13-14].

Different parts of *Myrtus communis* fruits, leaves and branches have been used as a folk medicine for the treatment of various diseases. It is used as a stringent, antiseptic hemostatic, blood purifier, laxative, anti-diarrheal, hepatoprotective, analgesic, anti hemorrhagic and anti-hyperglycemic vaginal lavage, enemas or hair tonic with emetic effects and hypolipemic activities. It is also used to treat peptic ulcers, bleeding, headache, palpitation, leucorrhoea, urethritis, conjunctivitis, pulmonary, analgesic, anti hemorrhagic, wound healing skin diseases and respiratory diseases [1,15-40].

The activity of myrtle is likely explained by its chemical components such as alkaloids, tannins, phenol, flavonoids (quercetin, catechin and myricetin derivatives), sugars, organic acids (citric and malic acids), saponin, anthraquinones, essential oils, hydrocarbons, alcohols, anthocyanin pigments, esters and fatty acids [7,41-42]. The essential oil of myrtle has been studied by many researches [3,43-45]. The major components were linalool (28.28%), α -pinene, 1,8-cineole linalyl acetate, limonene and α -terpineol. Some researchers have shown that the main components were 1,8-cineole (26.55%), α -pinene (19.40%), linalool (15.97%), terpineol and linalyl acetate [12,37,46-49].

The fatty acid content in the fruits of myrtle have been described previously [24,39,50-54]. Serce et al. [55] studied antioxidant activities of fatty acid composition of *Myrtus communis*, and reported that oleic acid is the dominant fatty acid (67.07%) followed by palmitic acid (10.24%) and stearic acid (8.19%), respectively.

The aims of this paper are to determine some chemical components of pickling herbs and *Myrtus communis* L. fruits using GC-MS.

2. MATERIALS AND METHODS

2.1 Plant Material

Myrtus communis L. fruits were collected from the north of Iraq and air dried. The powdered fruits (150 g) were extracted using 500 mL of n-hexane via a Soxhlet apparatus for 48 hours. The extracts were concentrated with a rotary evaporator.

2.2 Gas Chromatography-MS Analysis

GC-MS analysis was carried out in University of Basrah, College of Agriculture, Iraq using a Shimadzu GC-QP 2010 ultra-gas chromatograph. The GC oven temperature was programmed from 40°C to 280°C at a rate of 15°C/min. Helium was used as a carrier gas. The inlet pressure was 96.1 kPa. The linear velocity was 47.2 cm/sec. The column flow was 1.71 mL/min, and the injector temperature was 280°C with split injection mode. The MS scan conditions included the following: source temperature, 200°C; interface temperature, 280°C; detector gain, 0.69 kV +0.10 kV; scan speed, 1666; range 50 m/z to, 800 m/z. The components of the *Myrtus communis* were identified by comparing the spectra with known compounds stored in the NIST library (2005).

3. RESULTS AND DISCUSSION

The GC-MS chromatogram of *Myrtus communis* fruit extract (Fig. 1; Table1) showed sixteen peaks indicating the presence of sixteen compounds (phytochemical constituents). The identification of the phytochemical compounds was confirmed based on the molecular formula, peak area and retention time.

Most of the chemical components from *Myrtus communis* fruits are fatty acid methyl ester 4-5 components including linoleic acid methyl ester (27.19%), oleic acid methyl ester (21.18%), octane, 3,5-dimethyl was (16.47%) and dodecane (11.39%), palmitic acid methyl ester (6.80%), tetradecane (6.69%), and stearic acid methyl ester (3.32%) (Table 1; Fig. 1). Our results agreed with the literature [7,55] and identified palmitic acid, oleic acid and stearic acid. There were less fatty acids than the literature. Serce et al. [55] reported that the main fatty acids in the fruits of myrtle were oleic acid (62.13%) and palmitic acid. This was confirmed in our data.

In this study, the order of fatty acid methyl esters is as follows linoleic > oleic>. The results agree also with Serce et al. [55] who also found nonadecanoic acid methyl ester, eicosane, heneicosane. Our data conflict with Cakir, 2004. They reported lauric and myristic acids, but these were not detected in this study. Furthermore, there is an association between fruit color and fatty acid composition in myrtle plants. Darker fruits contain more fatty acids than white-fruits [55].

Many researchers reported that the chemical compounds found in medicinal plants change as a function of region. This may be due to genetic and environmental factors. The presence and absence of constituents can impact, the formation and genesis of products in the plants. Environmental factors such as climate, irrigation, soil, harvest season, temperature range, method of drying, storage conditions, and even the part of the plant tissue evaluated are all parameters that should be considered [14,56].

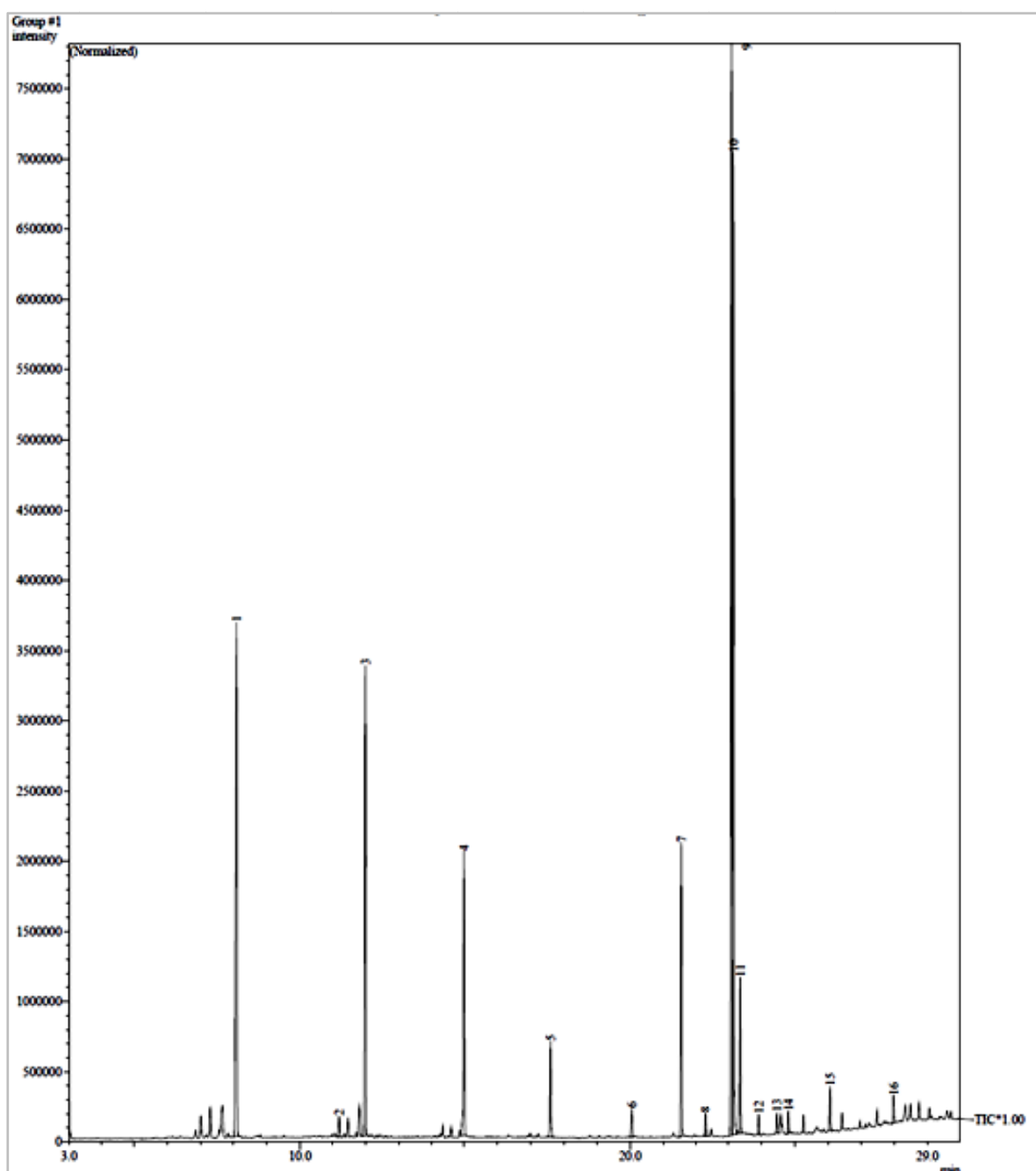


Fig. 1. Chromatogram of chemical compounds of *Myrtus communis* fruits

Table 1. Chemical compounds of *Myrtus communis* L. fruits using gas chromatography mass spectrometry (GC-MS)

Peak	M.F.	R. Time	Area	Area%	Component
1	C ₁₀ H ₂₂	8.099	10294381	16.47	Octane, 3,5-dimethyl
2	C ₁₂ H ₂₆	11.215	307237	0.49	2,6-Dimethyldecane
3	C ₁₂ H ₂₆	12.000	7120713	11.39	Dodecane
4	C ₁₄ H ₃₀	14.999	4184900	6.69	Tetradecane
5	C ₁₇ H ₃₆	17.592	1443503	2.31	Heptadecane
6	C ₂₀ H ₄₂	20.051	475506	0.76	Eicosane
7	C ₁₇ H ₃₄ O ₂	21.545	4253483	6.80	Palmitic acid methyl ester
8	C ₂₀ H ₄₀ O ₂	22.276	310572	0.50	Nonadecanoic acid methyl ester.
9	C ₁₉ H ₃₄ O ₂	23.097	16999092	27.19	Linoleic acid methyl ester
10	C ₁₉ H ₃₆ O ₂	23.152	13242185	21.18	Oleic acid, methyl ester
11	C ₁₉ H ₃₈ O ₂	23.356	2078401	3.32	Stearic acid, methyl ester
12	C ₁₂ H ₄₄	23.910	251860	0.40	Heneicosane
13	C ₁₃ H ₂₄ O ₂	24.459	282957	0.45	Tridecanedial
14	C ₂₁ H ₄₂ O ₂	24.797	284763	0.46	Methyl 18-methylnonadecanoate
15	C ₂₄ H ₃₈ O ₄	26.051	599020	0.96	1,2-Benzenedicarboxylic acid, diisooctyl ester
16	C ₃₆ H ₇₄	27.979	379950	0.61	Hexatriacontane
			62508523	100.00	

Myrtle fruits are used as food and they contain high vitamin contents and volatile oils that can offer several pharmacological effects and are used in the food and cosmetic industries [57-61].

The major essential fatty acid (linolenic acid methyl ester) is an antioxidant that can protect membranes from harm. It also inhibits proliferation of ER-positive and ER- negative breast cancer cells [62]. *Myrtus communis* contains many essential oils, tannins, terpenes, phenolic acids, hydrocarbons, alcohols, anthocyanin pigments, esters and fatty acids [62]. This can have anti-inflammatory, cancer preventive, hypocholesterolemic, hepato protective, antihistaminic, anti-androgenic, anti-arthritis, nematocidal and insecticide properties as well as heart-protecting properties [10,63-68]. *M. communis* extracts exhibit antibacterial, anti-parasite, anti-fungal, antiviral, and nematocidal activities and counteract infectious diseases [41,69-75].

4. CONCLUSION

GC-MS analysis revealed that 16 different chemical components were identified in the *Myrtus communis*, with high amount of linoleic acid (27.19%) helpful in revealing the pharmaceutical value of the plant. it also provides information about its trado-medical use. GC-MS analysis is important step towards understanding the nature of active ingredients in this medicinal plant and mentioned

phytocompounds would be useful in the preparation of novel drugs for treating diseases.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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