

The study of saturated and unsaturated fatty acids of 9 species of olives

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Abstract

The current study aims at diagnosing 8 saturated and unsaturated fatty acids of olives extracted out of 9 fruits of olives species related to olive family (Oleaceae) and the species are (Manzanilla ، Ascolana ، Sorani ، Baashiki ، NabaliMuhasan ، Frantoio ، Jlot ، Kaissy ، Picual). This study showed a difference in the concentration of saturated and unsaturated fatty acids among the studied species. The

highest concentration of unsaturated fatty acid: Liolenic c18 omega 3 – in the species (manzanilla) reached (816.5) , regarding the unsaturated fatty acid :liolenic c 18:2 omega 6 in the species (picaul) . in terms of the total number of saturated and unsaturated, the species no. (6) (manzanilla) recorded varieties and the species (Baashaki, Jiot, Picaul) recorded (7) varieties where the rest of species showed 8 varieties of fatty acids, where the proportion of saturated fatty acids also differed and the fatty acid (palmetric) reached the highest concentration in the species (frantoio) with (233.9). The lowest concentration was recorded in the species (picaul) and reached (3,9). As for the two saturated acids (stearic and myristic), the highest concentration was showed in the two species (Frantoio and Ascolano).

Introduction

OleaEuropea olive belongs to the olive family Oleaceae which includes 30-35 species and it is a subtropical permanent vegetative plant and it is the only plant that provides edible fruits[1]. Olive fruit is a good nutrition source, and very rich in fats where it reaches to 50-75% and contains proteins, sugars, bacterium, salts, vitamins A, B, C. olive have a beautiful scene so it is used in decorating gardens and parks[2]. It is also known in the Islamic Arab Medicine and used by the Arab Doctors, including IbnSina, in treating diseases. The vital and useful benefits of olives and olive fat are proved recently that they contain unsaturated fatty acids and the small compounds which are the most important Sterols and Tocopherol and triterpenoids and phenolic compounds[3]

The name of olive oil comes as a result of its containment of the Oleic acid c18:1 with high rate and it is a monounsaturated fatty acid[4] and its general formula (C18 H36 O2) and it is a kind of Omega-9 fatty acids. This important fatty acid in composing oil olive [4] and [5] and provides it with the status of save and storage for a long time in compare with the other oils reserving its features, and it is desirable acid which increases the nutritive value of olive oil and raises its importance in the treatment nutrition [6] and it reduces the concentration of saturated oils in the body and reduces the level of fats (Peroxidase) and its results like Malondialdehyde [7].

In addition to Oleic acid, olive oil contains acids (Liolenic acid c18:2 and Liolenic c18:3) which are poly unsaturated fatty acids. It also contains saturated fatty acids which arePalmitic acid(C16:0), Myristic acid(C14:0), Stearic acid (C18:0) , Lauric acid (C12:0) , Arachidic acid (C20:0)[8].

Research materials and methods

Preparing samples: (9) species of olives were used which are(Manzanilla ، Ascolana ، Sorani ، Baashiki ، NabaliMuhasan ، Frantoio ، Jlot ، Kaissy ، Picual)planted in some areas of Salah-aldin and some northern areas of Iraq. Fruits were accumulated in the complete ripeness stage from different positions of the tree and 5 trees were selected from each specie.

Extracting olive oil by cold Method

1- isolating the fruits before grinding them from the leaves, small branches and all the impurities existed, then washed by water to get rid of dust and chemicals precipitations.

2-At the beginning, grinding the bulb and then move the grinded olive bulb for an hour to reduce the overlap of oil from the water.

3-(100) ml. of warm water were added to each (1) kilo from the olive with 40 degrees Celsius and continuing moving for an hour.

4- the process of straining is carried out by using a piece of cloth to separate the solution that contains mixed oil and the vegetable water from the solid materials.

5-stable for four hours to separate the oily layer from the water.

6-Centrifuge processis carried out for the oily layer to separate oil from other compounds.

7- pulling the oily layer using a micro-absorbent and the storing it in plastic containers coated with Celifon with modulation.

Isolating the mixture of fatty acids using a HPLC pillar (cromotografia, a high-performance liquid) the size of minutes is 3micro-meter, internal diameter (4.6O 50 ml.), the pillar is C18DB, the moved phase is Asetonitral: Hidrophuran :1.0%, phosphoric acid in the(50.4:21.6:28V/V)UV detector at a wavelength of 250 nm.

The flow velocity is 1.5 ml. /min.

Temperature 40 C.

The separation occurs in (Chromatographic) liquid using a Shimadzu 10AV-LC associated with Shimadzu LC-10A pump, peaks were identified using Shimadzu SPD 10 A v detector, the concentration of saturated and unsaturated fatty acids were measured in each species depending on the comparison with the standard curve using the following equation:

Calculation

Concentration

$$\text{of sample mg/ml} = \frac{\text{area of sample}}{\text{area of standard}} \times \text{conc. of standard} \times$$

dilution Factor

[10].

Results and Discussion

The study showed a difference in the concentration of saturated and unsaturated fatty acids among the studied species. The highest concentration of unsaturated fatty acid: Linolenic c18 omega 3 – in the species (manzanilla) reached (816.5) , regarding the unsaturated fatty acid :linolenic c 18:2 omega 6 in the species (picaul) .

the fatty acid Oleic C 18:1 Omega 9 wasn't showed in the in Manzanilla specie and also the existence of saturated Archidie wasn't recorded in for species which are (Basashiki, Jiot, Picaul, Manzanilla), while the (Sorani) specie exceeded in giving the highest rate which reached (1512.1), The increase of unsaturated fatty acids rate

indicates the importance of the therapeutic and nutritional oil, where having these oils reduces the concentration of saturated oils in the body [11].

In terms of the total number of the saturated and unsaturated fatty oils, the Manzanilla (6) recorded varieties and the species (Bashaki, Jiot and Picaul) recorded (7) varieties. While the other species, (8) varieties of the fatty acids were showed, the rate of saturated fatty oils differed and the fatty acid Palmetic reached its highest concentration I (Frantoio) specie by (233.9). the lowest concentration was recorded in the (Picual) specie which reached (3.9), while the two saturated acids, Stearic and Mystric acids, the highest concentration has been showed in the (Ascolano and Frantoio) species.

It should be noted that Frantoio specie recorded the highest concentration for the acids, palmetric and mystric with (233.9 and 215.2) respectively. The difference in the number of fatty acids generally and the difference of the concentration of unsaturated and saturated fatty acids has a great systematic indication through which we can infer the species in addition to identifying the features of good oil for each one. The rate of some species were approximate for what is mentioned in [12] and [13].

Table (1): Determination of the percentage and concentration of saturated and unsaturated fatty acids in the studied olive varieties.

NabaliMuhasan		Baashiki		Sorani		Ascolana		Manzanilla		Acids	N
Percentage	Concentration of acid	Percentage	Concentration of acid	Percentage	Concentration of acid	Percentage	Concentration of acid	Percentage	Concentration of acid		
3.2	35.8	4.7	102.5	0.2	3.3	1.6	34.1	3.2	43.3	Lignoceric acid C:12	1
2.3	25.5	2.0	43.2	0.9	20.8	0.63	13.6	6.5	87.9	Palmetic C16:1	2
8.6	95.5	1.4	30.5	0.8	18.0	20.2	434.4	9.6	129.6	Stearic acid C18:0	3
4.9	55.2	5.4	117.4	1.6	35.9	5.4	116.6	8.7	116.9	Myristic acid C14:0	4
19.5	217.1	8.6	185.4	10.3	225.2	11.9	254.7	60.5	816.5	α -linolenic C18:3 omega 3	5
11.6	129.8	2.7	59.9	9.2	200.9	3.5	76.8	11.5	155.4	Linoleic acid C18:2 omega 6	6
40.7	543.96	75.2	1624.69	8.1	178.1	49.7	1068.5	Nan	Nan	Oleic C18:1 omega 9	7
9.2	102.82	Nan	Nan	68.9	1512.1	7.0	149.7	Nan	Nan	Arachidic acid C20:3	8

Table (2): Determination of the percentage and concentration of saturated and unsaturated fatty acids in the studied olive varieties.

Picual		Kaissy		Jlot		Frantoio		Acids	N
Percentage	Concentration of acid								
3.5	38.9	5.0	20.8	29.1	490.3	3.31	73.6	Lignoceric acid C:12	1
0.4	3.9	7.0	29.3	3.2	53.2	10.5	233.9	Palmetic C16:1	2
30.4	336.3	6.8	28.2	0.91	15.3	18.2	403.9	Stearic acid C18:0	3
15.4	170.9	19.8	82.6	0.4	6.9	9.7	215.2	Myristic acid C14:0	4
8.9	98.4	34.2	142.4	12.0	201.4	13.8	307.2	a-liolenic C18:3 omega 3	5
23.1	256.3	12.7	53.0	6.5	110.1	8.5	188.7	Linoleic acid C18:2 omega 6	6
18.3	202.5	13.8	57.4	47.8	804.1	31.4	697.7	Oleic C18:1 omega 9	7
Nan	Nan	0.7	3.0	Nans	Nan	4.5	101.0	Arachidic acid C20:3	8

The References

- ١- أبراهيم ،عاطف محمد و حجاج ، محمد نظيف (2007)، شجرة الزيتون، زراعتها ورعايتها و انتاجها، منشأة المعارف ، الاسكندرية ، 337 ص.
- ٢- جمال ، محمد حسني و السوسو ، مواهب (2009) ، الفاكهة مستديمة الخضرة ، الجزء النظري والعملية ، كلية الهندسة الزراعية ، جامعة دمشق.
- 3- **Suntarl,P; Akkol, E.K, and Baykal T, (2010)**,Assessment of anti-inflammatory and antinociceptive activities of *Olea europaea* L, *J,Med,Food*, 13(2):352-356.
- 4- **Ocakglu, D;Tokatli, F;Ozen,and B.andKorel, F, (2009)**,Distribution of simple phenols,phenolic acids and flavonoids in Turkish mono varietal extra virgin olive oil for two harvest years.*FoodChem* , 113: 401- 410.
- 5- **Eromoccele, C,(2002)**, Fatty acid composition of seed oil of *haematatap-* his barteri and *ximeniaamericana* ,*Tech*, 82(3): 4-303.
- 6-**Mailer, R,(2006)**,Testing olive oil quality, Chemical and sensory methods, NSW Department of primary industries, 1832-6668
- 7- **Assy, N; Nassar, F; Nasser, G, and Grosovski, M, (2009)**,Olive oil consumption and non-alcoholic fatty liver disease, *World ,Gastroenterol*, 15(15): 1809-1815.
- 8- **Priora, R;Summa,D;Frosali, S;Margaritis, A,andDiGiuseppe, D, (2008)**, Administration of minor polar compound-enriched extra virgin olive oil decreases platelet aggregation and the plasma concentration of reduced homocysteine in rats,*J,Nutr*, 138:36-41.
- ٩- الجبوري ، نور أبراهيم عجيل (2013)، دراسة كيميائية وتغذوية للزيت المستخلص بطرق متعددة من صنف الزيتون بعشيقي ومنزنيو المحليان ، رسالة ماجستير ، كلية الزراعة ، جامعة تكريت .
- 10- **Chouinard , Y; Corneau, L ,and Barbano , D ,M, (1999) ,** Conjugated linoleic acids alter milk fatty acids composition and

inhibit milk fat secretion in dairy cows , The Journal of Nutrition , v, 129, n, 8,P,1579-1584.

11-**Assy, N; Nassar, F; Nasser, G and Grosovski, M, (2009)**,Olive oil consumption and non-alcoholic fatty liver disease, World J,Gastroenterol, 15(15): 1809-1815.

12- **Ohbogge, J,B, and Jaworski, J,G, (1997)** , Regulation of fatty acid synthesis, Annual Review of Plant Biology 48, 109–136.

١٣- **درويش ، منعم عبد (2015)**، شجرة الزيتون تقنيات زراعتها وتصنيع ثمارها ، مشروع تطوير ونشر زراعة الزيتون في العراق ، دائرة البستنة وزارة الزراعة ، جمهورية العراق ص460 .