

FATTY ACID COMPOSITION OF OILS FROM FRUITS OF THREE *Pistacia* SPECIES GROWING IN IRAN

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The *Pistacia* genus belongs to the Anacardiaceae family and consists of 11 species. Three *Pistacia* species occur naturally in Iran, including *Pistacia vera*, *Pistacia atlantica*, and *Pistacia khinjuk* [1]. *P. khinjuk* and *P. atlantica* grow wildly and largely in the southwest and west of Iran. *P. atlantica* var *mutica* is the most popular species of *P. atlantica*. *P. vera* is a single domestic species of *Pistacia* genus, too. The major pistachio producers in the world are Iran, USA, Turkey, and Syria [2]. Iran, with its 350,000 ha of *P. vera* growing area, is indeed the greatest pistachio producer in the world. The most popular cultivar of *P. vera* in Iran is Ohadi (more than 60%) [3].

The oil of pistachio contains linoleic and linolenic acids that are essential in human diet. Moreover, these fatty acids have been shown to reduce the level of cholesterol in blood. They prevent cardiovascular diseases better than any other oil [4, 5]. Furthermore, pistachio nut oil is also used in the cosmetic and pharmaceutical industries [6].

In this investigation, the fatty acid composition of *P. vera* cv *ohadi* (PVO), *P. atlantica* var. *mutica* (PAM), and *P. khinjuk* (PKH) was studied. The fruit samples of PAM and PKH were collected from fields in Marvdasht and Kazeroon in Fars Province, respectively, and those of PVO were collected in Feizabad in Khorasan Razavi Province. All samples were stored at -18°C until analysis. PVO and PAM grow in mild and cool climates and PKH grows in warm regions.

The fatty acid compositions of the oils were analyzed by GC, and the results are given in Table 1. The major fatty acid components characterized in the oil were as follow: oleic acid (51.46–52.12%), linoleic acid (17.44–35.85%), palmitic acid (8.5–17.82%), palmitoleic acid (1.23–5.73%), stearic acid (1.48–2.61%), and linolenic acid (0.95–1.5%), but margaric acid (0.4%), margaroleic acid (0.43%), gadoleic acid (0.76%), and erucic acid (0.88%) were only identified in the fatty acid composition of PKH oil.

Fatty acid components representing about 99.51–99.73% of total oil were characterized. The amount of saturated and unsaturated fatty acids in the kernel oils were found to be 10.04–20.83% and 71.6–84.9%, respectively.

The main fatty acid component found in PKH, PVO, and PAM oils was oleic acid, and no significant difference was observe for the three pistachio varieties studied. Linoleic acid was a secondary fatty acid for PVO and PAM oils, but in PKH oil, there was no significant difference between linoleic acid and palmitic acid contents.

The amount of palmitic acid and palmitoleic acid was greatest for PKH oil, followed by PAM and PVO oils, respectively. The amount of stearic acid in PKH and PAM oils was statistically the same, which was greater than that in PVO oil. The linoleic acid content of PKH oil was much lower than that of PVO and PAM. The percentage of linolenic acid in the three pistachio varieties studied was approximately the same.

The PKH oil was characterized by its higher palmitic and palmitoleic acids in comparison with PVO and PAM oils. Margaric, margaroleic, gadoleic, and erucic acids were also identified in the fatty acid composition of PKH oil.

From the viewpoint of nutritional value, PVO is the best *Pistacia* species (having the highest unsaturated fatty acids especially essential fatty acids, and the lowest saturated fatty acid), followed by PAM and PKH, respectively.

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TABLE 1. Fatty Acid Composition of PVO, PAM, and PKH Oils, %*

Fatty acid	<i>P. khinjuk</i>	<i>P. atlantica</i> var <i>mutica</i>	<i>P. vera</i> cv <i>ohadi</i>
14:0	0.04 ± 0.06 a	0.33 ± 0.57 a	0.06 ± 0.09 a
16:0	17.82 ± 0.11 a	10.7 ± 0.51 b	8.5 ± 0.50 c
16:1	5.73 ± 0.07 a	1.81 ± 0.18 b	1.23 ± 0.3c
17:0	0.4 ± 0.02	—	—
17:1	0.43 ± 0.09	—	—
18:0	2.61 ± 0.08 a	2.44 ± 0.33 a	1.48 ± 0.48 b
18:1	52.12 ± 0.16 a	51.73 ± 0.43 a	51.46 ± 0.7 a
18:2	17.44 ± 0.62 c	31.34 ± 1.02 b	35.85 ± 0.76a
18:3	1.5 ± 0.07 a	1.16 ± 0.12 b	0.95 ± 0.70 ab
20:1	0.76 ± 0.06	—	—
22:1	0.88 ± 0.06	—	—
Σ _{Sat.}	20.83 ± 0.17 a	13.47 ± 1.16 b	10.04 ± 1.13c
Σ _{Unsat.}	78.44 ± 0.57 c	86.04 ± 0.65 b	89.49 ± 0.95 a
Σ _{Fatty acids}	99.73 ± 0.34 a	99.51 ± 0.28 a	99.53 ± 0.39 a

*The data are expressed as percentages of total fatty acids. Each value represents the mean of three experiments. The means with the same letter in each row do not significantly differ at the 0.05 level.

PVO and PAM had indeed similar fatty acid composition, but the fatty acid composition of PKH was very different. Previous studies indicated that pistachios grown in hot temperatures (over 25°C) tend to produce low amount of palmitic acid [7], but in the present investigation, the palmitic acid content of PKH was greatest even though *Pistacia* species grows in a warm climate. Therefore, the difference in the fatty acid composition of PVO, PAM, and PKH may be due to their different genetic properties.

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