

Physico-chemical properties of two type of Shahrodi grape seed oil (Lal and Khalili)

Morvarid Yousefi^{1*}, Leila Nateghi¹

¹Department of Food Science and Technology
Varamin-Pishva Branch, Islamic Azad University
Varamin, Iran

e-mail: Yousefi.morvarid@yahoo.com, leylanateghi@yahoo.com

Abstract

The present investigation was designed to evaluate the physicochemical properties of two type of Shahrodi grape seed oil (Lal and Khalili) which extracted by Soxhlet methods and petroleum ether as solvent. The physicochemical properties considered as response variables were: cloud percentage of extraction, peroxide value, acidity, soapy number, fatty acid and non soapy material. The results indicated that Lal grape seed oil showed the lower peroxide value and higher percent of oil extraction than Khalili grape oil. The results of this study indicated that the most content fatty acid in the seed oils of Lal and Khalili grape was linoleic acid, ranging from 63.17 % and 65.39 % of total fatty acids respectively. Also, The grape seed oils were contained low level of saturated fatty acid and high percentage of oleic acid and which are healthy and have beneficial effect on reducing cholesterol level.

Key words: Grape seed oil, Fatty acid.

Introduction

Grape (*Vitis vinifera*) is one of the most important of fruit and according to the FAO it was produced about 58 million metric tons annually (FAO, 1997), and its production was increased that its production was over 67 million metric tons in 2005. The history of grape planting in Iran, back about 2000 years before Christ with 252197 hectares, 75% farmland for farming the grape in the world and Iran is the sixth country (karimian, *et al.*, 2011). About 80% of the grape production is referred to juice-making, and also in this process seeds and skin was abstained witch was formulated for an animal feed (Choi, *et al.*, 2010). The investigation on grape seed has been increasing since its positive effects was shown on human health. (Fernandez *et al.*, 2008). GSO is free of cholesterol. Studied has sown if daily intake of GSO resaved to 45 g HDL-Cholesterol content increased about 13% and deacresed LDL-cholesterol percent about 7% in three weeks.(Nash ,2004) GSO contains tocopherols witch are the most important natural antioxidants and also have vitamin E activity. (Martinello *et al.*, 2007). Therefore GSO is one of the most important sources of vitamin E and contains rather high level of tocotrienols and tocopherols in the limit of 1–53.06 mg of vitamin E/100 g of oil. (Freitals *et al.*, 2008).Therefore, due to this unit properties of GSO, its commercialized as a food ingredient in food industry ,pharmaceutical applications and for cosmetic. Therefore, by

consoling the unique attributes of grape seed's oil and high rate of production of grape seed, it needs more attention on this production. About Physico-chemical properties of grape seed oil, different studies have down. (Gbmez *et al.*, 1996)(Freitals *et al.*, 2008). (Lutterodt *et al.*, 2011) (Karimian *et al.*, 2011) The aim of this study was to compare of the characteristics of two different kinds of shahrood's grape, Khalili and Lal grape.

Materials and methods

Methods of preparing of samples

It is study two samples of shahrood's grape were provided Lal and Khalili grape witch dedicated most part of grape farming land. Then all samples, separately, were milled and then oil extracted by the method of Soksleh by the use of petroleum ether solution in 90°C for 6 hours.

Methods

Peroxide value was done according to AOAC standards NO. 965.33. The present of acidity was done according to National standard. No: 4178. Refract index was done according to national standard NO. 5108. The soapy number was done according to national standard. No: 4888. Iodine number was done according to national standard NO. 5108. Inorder to determine amount of fatty acids compounds all experimental samples were methyled according to AOAC standard No. 969.33 and then in order to examination of fatty acid compound it used according to AOAC standard NO. 940/28. It was used Gas chromatography Model, Youglin 6000 with Detector ionization flame veston moiin with long of 60 m with moving phase hydrogen Gas. Injection temperature 250°C, Program temperature 150°C, for 5 minutes and increasing of temperature with 5°C in per minute was until 175°C and keeping it for 35 minutes.

Data Analysis

Data collected from the aforementioned study samples were analyzed based on 0.05% coefficient of error by a software program. The data analysis was performed using MINITAB statistical software, release 14.2 (MINITAB Inc., state college, PA and USA). At first such software program proved samples normal conditions and then the significant difference among data was precisely studied via Non – parametric Kruscal – wallis test and *p*-value was determined.

Results and Discussion

In Table 1 the percent of oil extraction and physico chemical properties of the two grape seed oil in cloud density, refract index, acidity, peroxide value, iodine number, soapy number and non soapy material are given.

The most important differences between oils are peroxide value and percent of oil extraction whose peroxide values was lower and oil extraction was higher for Lal Shahrodi than Khalili Shahrodi. This result has shown that the percent of extraction oil from Lal Shahrodi grape is 23.14%, and Khalili Shahrodi is 18.3% and this difference statistically was significant ($p \leq 0.05$). Therefore oil extraction of Lal Shahrodi was more economic than Khalili Shahrodi. Peroxide is the first production from oxidation of oil and presence in oil shows that beginning of oxidation that is very undesirable. Then less peroxide number shows the better quality of oil, this value for the Khalili grape is 10.63 and for Lal Shahrodi is 90.30%, therefore the oil of Lal Shahrodi grape is more desirable than Khalili grape. Also, statistic results have shown significant difference between these two samples. ($p \leq 0.05$). Iodine number shows the saturation value of oils and if it is increased its mean double bond decreased. Acceptable limit for this value is 128-150 and therefore both of this oil was acceptable. Refract index shows the break coefficient of oil and shows the quality of oil, if there are more compounds with higher molecular weight in oil, break coefficient will be more and rate of this index will increase during oxidation are berated in first products like peroxides and are produced other compounds like Aldehyds, Ketone, Alcohol, and finally that compounds combine and product compounds with high molecular weight which due to increase of refract index and density. The rate of refract index and density for Khalili Shahrodi grape is 1.473 and 0.924 respectively and its a little more than Lal Shahrodi but they didn't have significant difference statically ($p \leq 0.05$), this phenomena may be due to more oxidative reaction in the Khalili Shahrodi. Also refract index both of them are according to national standard. Acidity of these samples is not different ($p \leq 0.05$) but in Khalili Shahrodi is more than rate of national standard. There was no difference between two oil about soapy and non soapy material ($p \leq 0.05$) and both of them matched with national standard. This result was agreed with Gbmez *et al*, (1996) and yousefi *et al*, (2011.). Linoleic acid was the most fatty acid in both two GSO, with limit between 63.17% and 69.39% of total fatty acids (Table 2). Also this oils has high concentration of oleic acid, 23.19% and 25.10% for Lal Shahrodi and Khalili Shahrodi respectively. After this two fatty acid palmitic acid (8.92 - 9.01%) and stearic acid (4.21-4.33%) has high concentration. Whole percent saturated fatty acids were below 14, while poly-unsaturated and mono fatty acids totaled about 24.2% and 64%, respectively (Table 2). These results was similar in the previous work which linoleic, oleic, palmitic and stearic acid acid limit of 60.16-64.90%, 22.29-20.70, 9.66-7.36 and 3.7-4.70 in the two variety of grape seed oils respectively. (Karimian *et al*, 2011) Some studied have, however, reported lower or higher content, depending on seed origin, variety and method of oil extraction. Lutterodt (2011) has shown higher linoleic acid and lower oleic acid content in grape seeds. (Lutterodt *et al*,

2011) This results has shown that differences between grape seed oils from different origin and varieties.

Conclusion

During of grape juice process was produces high level of fruit seeds. That its oils has suitable source of essential and other health-benefitting fatty acids. Chemical and physicochemical characterization of grape seed oil was presented in this work. The results of the profiles of fatty acid, indicated that two main fatty acid, in GSO were linoleic and oleic acid which are essential fatty acids for body and less volume of saturation acid rather other oils, therefore has beneficial effect of human health. So the use of this oil is suggested as plant oil in daily diets.

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Table 1: chemical properties of two different grape seed oil

Chemical properties	Grape lal Shahrodi	Grape Khalili Shahrodi	Acceptable limit
Oil extraction (%)	23.14 ±1.02	18.3±0.22	-
Density	0.919±0.02	.924±0.12	
Acidity (%)	0.61±0.07	0.67±0.05	Max 0.6
Peroxide value (meq/kg)	9.30±0.65	10.63±1.30	Max 10
Iodine number	123.55±0.15	126.13±1.02	128- 150
Soapy number (mg KOH/gr)	190.02±0.18	187.5±1.06	188-194
Non soapy material	1.43±1.02	1.47±0.12	Max 2
Refract index (40°)	1.470±0.01	1.473±0.02	1.467-1.477

Table 2: fatty acid profile of two different grape seed oil

Fatty acid (%)	grape Lal Shahrodi	grape Asgari Shahrodi	Acceptable limit
C14:0	0.05	0.9	0 - 0.3
C16:0	8.92	9.01	5.5 - 11
C16:1	0.36	0.42	0 - 1.2
C17:0	0.10	0.12	0 - 0.2
C17:1	0.07	0.08	0 - 0.1
C18:0	4.21	4.33	3 - 6.5
C18:1	23.19	25.10	12 - 28
C18:2	63.17	65.39	58 - 78
C18:3	0.78	0.82	0 - 1
C20:0	0.24	0.21	0 - 1
C20:1	0.21	0.23	0 - 0.3
C22:0	0.9	0.12	0 - 0.3
C24:0	0.03	0.04	0 - 0.1