

Effect of Different Temperatures And Extraction Systems on Viscosity of Chia Seed Oil

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Abstract

In this study, oil of Chia seeds (*Salvia hispanica* L.), which was roasted at 90 °C and 120 °C, was obtained by ultrasonic extraction, solvent extraction and cold press methods. Viscosity measurements of the obtained oils at constant temperature and suitable conditions were made. Partial differences were observed in the viscosity values obtained depending on the roasting temperature. Raw Chia seed oil was obtained by pressing, soxhlet and ultrasonic extraction methods and viscosity values were determined as 30.07, 30.80 and 31.00 mPa.S, respectively. With the roasting process, an increase in viscosity values of oils obtained by pressing method was observed. A decrease in viscosity values was detected in roasted Chia seed oils obtained by the soxhlet method.

Keywords: Chia (*Salvia hispanica* L.), roasting, viscosity

1. Introduction

Chia seed (*Salvia hispanica* L.) is a one-year herbaceous plant that belongs to the Lamiaceae family and extends from southern Mexico to northern Guatemala. It can be cultivated in tropical and subtropical regions. Seeds are grown commercially in Mexico, Bolivia, Argentina, Ecuador and Guatemala [1]. The annual production of chia seeds, dating back to the Aztec and Maya, is around 30 000 tonnes worldwide [2,3].

Chia seed is a prehistoric seed variety that has become popular as super food in recent years due to its high content of fat, protein and dietary fiber [4]. Chia seeds contain approximately 15-24% protein, 26-41% carbohydrate and 25-40% fat. It has been the subject of many studies mainly with high quality fat content, it has almost 55-60% linolenic acid (ω -3), 18-20% linoleic acid (ω -6), 6% monounsaturated ω -9 and 10% saturated fatty acid content [5]. In chia seed which is a good source of unsaturated fatty acids, n-6 / n-3 ratio was found to be 0.30. The low n-6/n-3 fatty acid ratio has been associated with a reduced risk of cardiovascular disease [6,7]. Oil content and fatty acid composition of Chia seed are affected by seasonal conditions, growing conditions, genotype and geographical characteristics [3,8].

Chia seeds are a promising source of phytochemicals, antioxidants due to the presence of polyphenols, chlorogenic and caffeic acids, myricetin, quercetin and kaempferol, which protect consumers against adverse conditions such as cardiovascular diseases and certain cancers [1,9-13]. On the other hand, the seed contains more than 35% of the total weight of soluble and insoluble dietary fiber and is a rich source of B vitamins and minerals [5]. In addition to magnesium, iron, zinc and copper, it has 6 times more calcium, 11 times more phosphorus and 4 times more potassium than 100 g milk [9,10].

The purpose of this study; Raw Chia seeds and roasted (90° C and 120° C) oil is obtained by pressing, soxhlet and ultrasonic extraction methods and investigating the effect of different roasting temperatures on viscosity values by making viscosity measurements in the obtained oils.

2. Material and Methods

2.1. Material

In this study, Chia seeds were obtained from a local market in Konya. Samples brought to the laboratory, leaf, stone, soil, etc. cleared of foreign materials. Oil was obtained to be used in the analyzes by ultrasonic extraction, solvent extraction

and cold press methods. Viscosity measurements were made with the oil obtained.

2.2. Methods

Chia seeds were heat treated at 90 °C and 120 °C for 30 minutes in the oven.

2.2.1. Oil Extraction:

Oil was obtained from Chia seeds using ultrasonic extraction, solvent extraction using petroleum ether and cold pressed screw press [7].

2.2.2 Viscosity measurement:

Viscosity measurements were made with the AND Sine-Wave Vibro Viscometer, 0.3 to 10000mPa s,

Model SV-10 device under suitable conditions at constant temperature in the obtained oils.

2.2.3. Statistical Analysis:

3×3 factorial trial was set up to investigate the effects of the oil obtained on the viscosity measurements of the roasting temperatures. p value was found to be 0.662. Since the P value is greater than 0.10, it is not statistically significant.

3. Results and discussions

The viscosity results of chia seeds are shown in Table 4.1.

Table 1. Viscosity values of Chia seed oils

	Raw	90°C	120°C
Cold Press	30.70±0.56*	30.80±0.84	31.00±0.70
Soxhlet	31.20±0.28	30.85±0.77	30.55±0.07
Ultrasonic	31.05±1.06	30.50±0.56	31.40±0.42

*mean±standard deviation

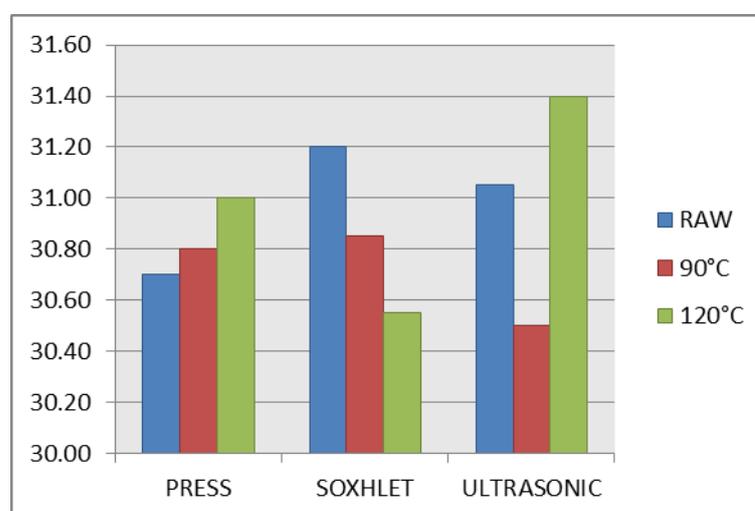


Figure 1. Viscosity values of oils obtained by pressing, soxhlet and ultrasonic methods of raw and roasted (90 °C and 120 °C) chia seeds.

The oil of Chia seeds (*Salvia hispanica L.*), which was roasted at 90 °C and 120 °C, was obtained by ultrasonic extraction, solvent extraction and cold press methods. Viscosity measurements of the obtained oils at constant temperature and suitable conditions were carried out.

While the viscosity values of the raw seed oil obtained by the press method and the Chia seed oil roasted at 90 °C were found as 30.70 and 30.80

mPa.S (25 °C), respectively, the viscosity value of Roasted Chia seed oil at 120 °C was 31.00 mPa.S (25 °C).

Viscosity values in oils obtained by the Soxhlet method were 31.20 mPa.S (25 °C) in raw seed oil and 30.55 mPa.S (25 °C) by roasting at 120 °C (Fig 1). In oils obtained by ultrasonic extraction, viscosity values of raw Chia oil and Chia oil roasted at 120 °C were determined as 31.05 and 31.40 mPa.S (25 °C), while the viscosity value of roasted

Chia seed oil at 90 °C was determined 30.50 mPa.S (25 °C). Timilsena et al. [14], the viscosity value of Chia seed oils was determined as 43.23 mPa.S (25 °C).

4. Conclusions

According to the measurement results obtained, partial differences were observed in the viscosity values of the oil depending on the roasting process at 90 °C and 120 °C. As the roasting temperature increases, the viscosity values of the oils obtained by pressing method have been increased. Depending on the roasting temperature, a decrease in viscosity values was observed in the oils obtained by the Soxhlet method.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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