The Effect of Adding Different Concentration of Vitamin E to Frying Oil on the Peroxide Value

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Abstract

The aim of this research is to reduce the number of peroxide in two frying oil samples (Aldura and altusan) by using one of the natural antioxidants which is vitamin E. one of the chemical specifications that assess the oil is the peroxide number, which is the amount of free radicals formed in the oil and the number of peroxides increases during exposure to heat, moisture, oxygen, bad storage conditions, light or other conditions. These peroxides have a harmful effect on the consumer health (initiation cancer). The vitamin E had a clear impact on the peroxide value, as when conducting the experiment and using oil to fry potato slices, the number of peroxide was high before adding vitamin E which score (Peroxide number is 5.6 for 15 minutes, 9.8 for 30 minutes, and 11.6 for 45 minutes). After using vitamin E in amount of 10 microgram per 100 ml of oil, the effect was clear of vitamin E on the number of peroxide as it decreased significantly. Which scored (5 for 15 minutes, 8.1 for 30 minutes, 8.9 for 45 minutes). When vitamin E added by 20 microgram the result was (4.8 for 15 minutes, 5.5 for 30 minutes, 6.5 for 45 minutes). 50 microgram per 100 oil shown to have no significant effect on the peroxide value. it was found that the best concentration is 20 microgram for a sample of 100 ml of oil.

Keywords : *frying oil, peroxide value, vitamin E*

Introduction

Frying is one of the daily habits of most consumers around the world [1]. When frying at the commercial or institutional level, it is usually done continuously and at high temperatures, and often an amount of old oil is added repeatedly and the frying process continues. also it is constantly exposed to oxygen, in addition to the presence of water in food, this may leads to a series of chemical changes due to the deteriorating characteristics of frying oil and for. Thus, it form non-volatile compounds and free radicals that negatively affect the properties of oil, and on the other hand, they negatively affect food and constitute a danger to the consumer health [1-6]. Due to these changes that occur in foods during frying, the demand for more stable oils when frying increased, and it was found that Vitamin E has a positive effect to reduce these changes. Vitamin E have a unique colour which is pale yellow oil, acid and heat resistant, in-soluble with water [2]. Extremely slow in oxidation. which gives it an important role as an antioxidant agents. Vitamin E is a soluble in fat but not water that consists of eight formulas alpha, beta, gamma, delta tocopherol and alpha, beta, gamma, delta tocotrienol, obtaining it means preventing oxidation of fatty acids and preventing oxidation of low-density Lipoproteins, which also reduces the possibility of human infection with atherosclerosis. This vitamin is concentrated in red and retinal blood cells and respiratory membranes [7,8]. When a person increases the intake of unsaturated fatty acids, he should increase his intake of vitamin E, however, many of them ignore the importance of this vitamin and the reason for this because they follow a routine diet that lacks vitamin E as in the ease of obtaining an appropriate amount of this vitamin by eating foods rich in it is considered an important factor in maintaining immunity and preventing a group of diseases and obtaining healthy and beautiful skin. [6] Vitamin E also has been found to be important in preventing colon cancer, prostate and breast cancers. Also some cardiovascular diseases some time poor eye lens, arthritis and some neurological disorders. Vitamin E, which is found in some vegetable oils such

as corn oil and soybean oil, is able to fight cancer and inhibit cell growth Cancer Vitamins in our diets are found in various forms, and Vitamin E is one of these vitamins [7]. Researcher Zhong Yang stated in 1995 that vitamin E in the form of Tocopherols Gama is found in many natural diets and Tocopherols Delta is found in vegetable oils are useful in the treatment of types of cancer and chronic diseases and various infections and reduce the risk of infection by either Tocopherols Alfa is the most commonly used formula in vitamin E, which some take as a dietary supplement from pharmacies [8-10]. Vitamin E is also considered to be one of the most important antioxidants agents that fight free radicals, the main cause of toxins accumulation and the spread of incurable diseases in the body. And as we mentioned, the thermal treatment of the oil leads to the rancidity of oils, forming peroxides, as oxidation occurs in light, oxygen, or traces of heavy metals and storage. (Frankel, 1998) The peroxide value is used to determine the degree of oxidation in fats and oils as oxygen interacts with the lipid molecule and creates free radicals in the form of peroxides. The objective of the current study is to evaluate the effect of adding different concentration of vitamin e to frying oil on the peroxide value.

Materials and Method

Oils and food

Two samples were used, the first is Iraqi origin oil type Aldar and the second is Tunisa which is Turkish made. The oil was obtained from local markets and vitamin E with a concentration of 98% from a specialized office for the supply of chemicals shop.

Peroxide value

All tests for the value of peroxide are based on a measurement of the amount of liberated iodine when potassium iodide interacts with rancid fat. In the Lea method, one gram of fat and one gram of potassium iodide are used with a solvent consisting of acetic acid and chloroform in a ratio of 2_1. After this heating is made to estimate the iodine produced by correction with a standard solution of sodium thiosulfate (0.03%). According to the following equation.

Peroxide number = volume (ml) 10 * 0.1 * Na_2SO_3 / sample weight (g) (Firestone, D. 2009).

As the amount of peroxide was estimated before the thermal treatment, the amount of peroxide after the thermal treatment was estimated at the mentioned concentrations and times.

RESULTS AND DISCUSSION

At the beginning of the work, the peroxide value was estimated for both sample al-Dar and Altonsa (Iraqi and Turkish origin)respectively. The control samples were low due to the lack of frying process. the peroxide number was measured for both Al-Dar and Altonsa oil during frying in 15, 30 and 45 min of the processing at a fixed temperature. 4.1 and 6.4 respectively, and kept on was rising In the value of peroxide this indicates the formation of free radicals and after continuing frying for 30 minutes the value of peroxide increased more than the first value and after continuing frying for more than 45 minutes the value of peroxide increased more.

The value of peroxide increases to a large degree, from which we conclude that by repeating the frying process of the oil and increasing the time, the value of peroxide is constantly increasing frying and this indicates the formation of free radicals (Hopia, Huang, & Frankel, 1996).

100 ml of oil was used to fry potato slices without adding vitamins, and three samples were taken during different time periods, so the peroxide number was as follows:

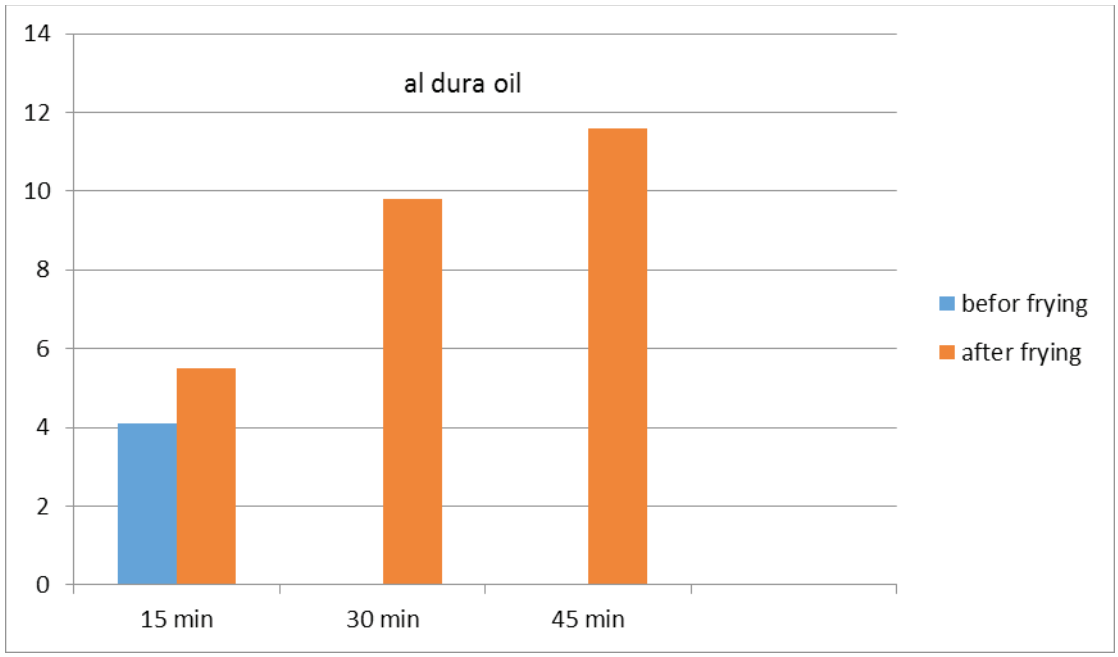

Figure 1. Three samples were taken during different time periods.

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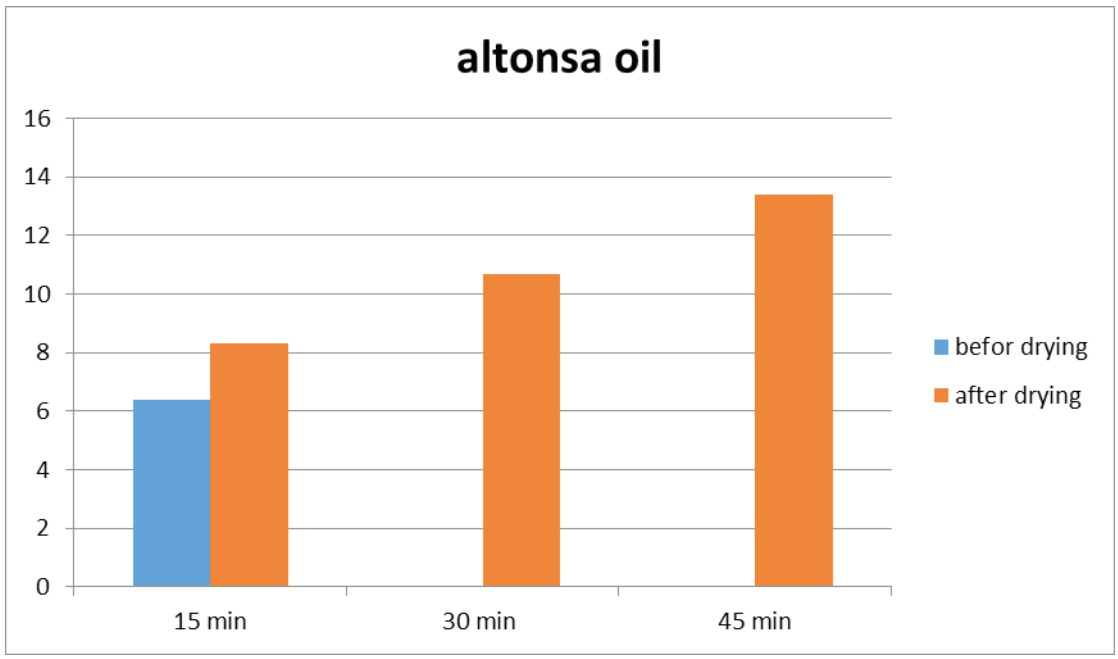

Figure 2. Three samples were taken during different time periods.

After that, liquid vitamin E was used with a concentration of 98%. The first use is 10 micro ml of micropipette and was added to 100 ml of Aldar and Tunisa oil.

And the process of frying the oil with the material potato slices for 15 minutes, and there was a decrease in the value of peroxide by a little degree compared to the lack of adding vitamins, as well as the continuation of frying process.

The second use is 20 micro ml of vitamins to 100 ml of Aldar and tuna oil. The oil was used for frying by adding vitamins to it for 15 minutes. It was found that

there was a noticeable decrease in the value of peroxide and the continuation of the frying process for 30 minutes. The value of peroxide increased, but to a lesser extent than its rise without using the vitamin Likewise, for the continuation of the frying process for 45 minutes, as the peroxide number has increased, not like the high peroxide value without the vitamin.

The third use is 50 micro ml of vitamins to 100 ml of Aldar and Tunisa oil. The oil was used for frying for the same mentioned periods of time. The results were different to a lesser degree than the results using 20 micro ml of vitamins, as well as for other results, regardless of the numbers, constantly frying. This indicates that No significant change occurred when the vitamin concentration increased and these results were consistent with [10,14] The higher the percentage of the vitamin, there will be no significant change.

After that, the vitamin was added in different concentrations. Use the oil by frying the potato slices. The results are as follows,

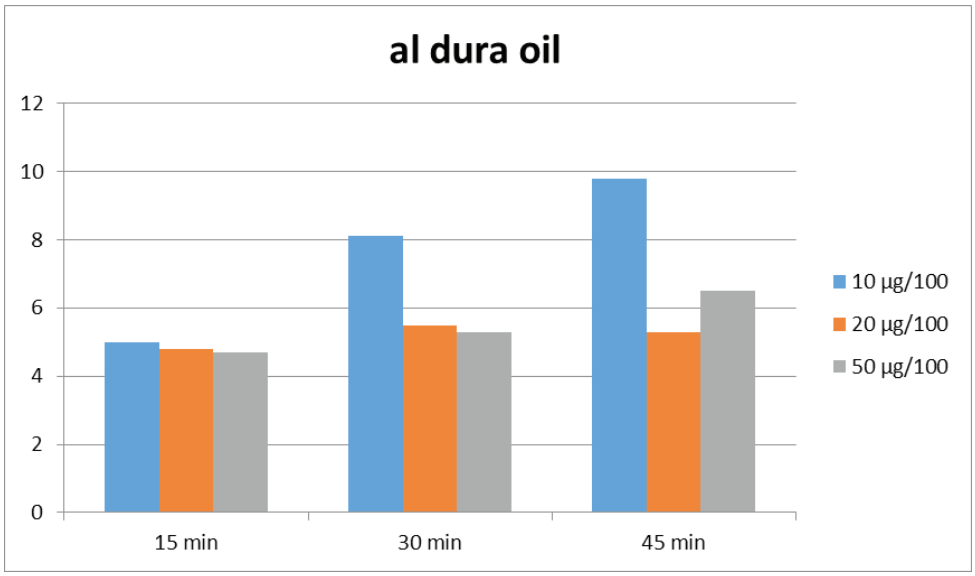

Figure 3. The vitamin was added in different concentrations.

After that, the vitamin was added with the same aforementioned concentrations. The oil was used by frying the potato slices. The results were as follows:

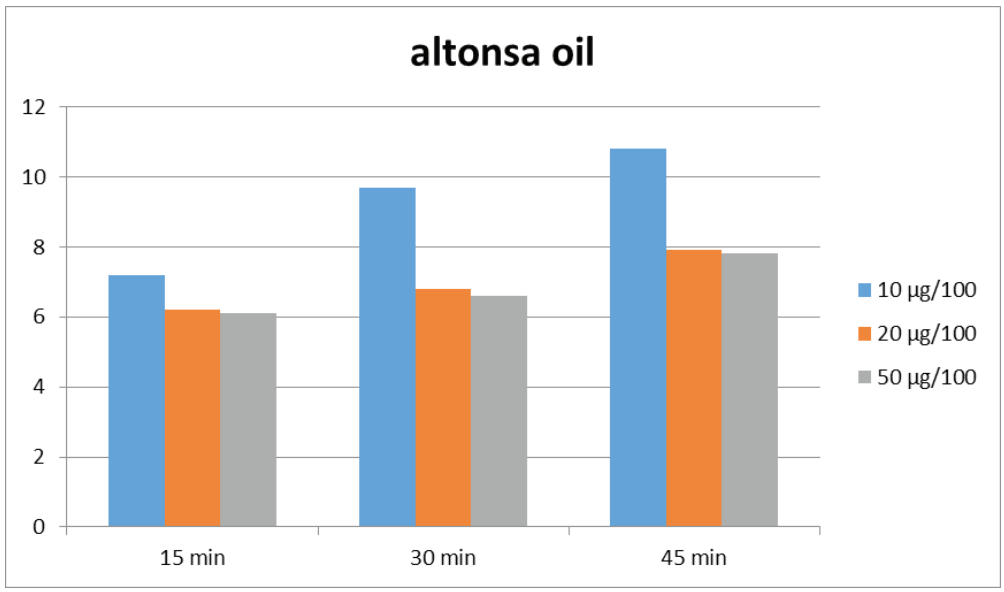

Figure 4. The vitamin was added in different concentrations.

We conclude from this that the heat leads to an increase in the peroxide number with repeated use and an increase in time and that the use of vitamin E in the amount of 20 microgram per 100 ml of oil has resulted in a significant decrease in the value of peroxide and that the increase in the vitamin is not of little effect depending on the amount of oil used and its increase when using A greater amount of oil, this means that there are limits to reducing the number of peroxide in the oil, so that the increase in the vitamin did not show a significant decrease in the number of peroxide. The addition of vitamin to frying oils reduces the number of peroxide and this corresponds to [15]

Recommendations

1- Use of originating oils with a low peroxide number, as the Iraqi oil had a lower peroxide number than the Turkish one.

2- Storing oils in places away from sunlight and not storing them in hot places.

3- Not to use oil for frying more than once and for the shortest period of time possible.

4- Use vitamin E and add it to oils before using them to reduce the number of peroxide, according to the mentioned percentage.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Al-Qasim Green University and all experiments were carried out in accordance with approved guidelines.

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