



A Survey on Peroxide Content and Acidity level of Persian Doughnuts in Lorestan Province, West of Iran

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Abstract: There are different chemical food contaminations that cause detrimental effects on human health. For example, presence of peroxide in fried foods causes free radical formation. Free radicals are not only responsible for food spoilage, but also cause damage to body tissues and cancer, inflammatory diseases, atherosclerosis, aging and so on. The aim of this study was to evaluate the peroxide content and acidity level in Zoolbia and Bamiehin of Lorestan province, West of Iran. 120 samples of Zoolbia and Bamieh doughnuts were purchased of Lorestan province distribution centers, during March 2014 to March 2015 and handled to Laboratory for chemical analysis and determination of their peroxide value and acidity. Present descriptive study results showed 56.92 and 43.07 % of the samples were out of standard limit and not suitable for consumption due to high levels of peroxides and acidity, respectively. The lowest and highest peroxide value were 1.1 and 2.9 mEq/kg, respectively. The minimum and maximum acidity of the samples were 0.7 and 2.9 wt%, respectively. Obtained results showed high peroxide contents in Persian doughnuts in Lorestan province than standard limit. Therefore, it seems educational programs about nutrition and using proper method for cooking and frying of foods is necessary. Continuous planning and surveillance, providing practical solutions by health authorities and regulatory organs, training of food staffs, using oils a few times and especial for food frying are recommended to reduce the peroxide content in Persian doughnuts (Zoolbia and Bamieh).

Keywords: *Zombie and Balmier, Acidity, Peroxide, Lorestan province, Iran*

Introduction

Foods are important sources for transmission of infectious diseases so that 70% of human's illness is due to food contaminations by chemical and biological agents. Main origin for biological contamination of foods are animal sources [1, 2], but chemical contamination of foods is due to external entrance of chemical agents in foods or their ingredients changing during food processing.

Fats and oils play an important role in the taste, smell, texture and nutritional quality of foods. Regardless of the source, amount and fat composition, monitoring of fat and oil quality has great importance during foods

preparation and processing [3]. Frying as one of the oldest and popular methods of food preparation in the world has a large share in food trade, economically [4]. Frying process caused free radicals formation which will be converted to peroxides as first product of fat oxidation. Free radicals are not only responsible for food spoilage, but also cause human diseases such as cancer, inflammatory disorders, atherosclerosis, tissues damage, and aging and so on [5].

Unsaturated fatty acids increasing in oils and fats enhance risk of oxidation and free radical formation [6]. Fats oxidation is one of the main factors of food spoilage. Reaction of

oxidized fats with proteins and carbohydrates caused important chemical changes in food. Their oxidation caused undesirable taste and aroma, partial or complete damage of vitamins and other nutrients through chemical mediators in various stages of oxidation [7].

Frying is one of the common methods of using heat for preparing foods and cause pleasant taste and good color in food with pleasant for most people [8, 9]. Due to tremendous effects of hydrogen peroxide on human health and the importance of its value in foods and food products, the aim of this study was to determine the peroxide value of used edible oils for preparing Persian doughnuts named Zoolbia and Bamieh in preparing centers of Lorestan province, west of Iran.

Materials and Methods

Sampling: 120 samples of Zoolbia and Bamieh doughnuts were purchased of Lorestan province distribution centers, during March 2014 to March 2015 and handled to Laboratory for chemical analysis and determination of their peroxide value and acidity.

Measuring of peroxide value (mEq/kg):

Five grams oil weighted in a 250 ml Erlenmeyer flask and 18 ml acetic acid plus 12 ml of chloroform added to it. Flask shakes until dissolving oil in solvent. Then 0.5 ml saturated potassium iodide solution added and stirred well and put in a dark place. After 1 minute, 30 ml of distilled water added. Then 0.5 ml of 1% starch as an indicator added. At the end stage titration proceed with Na hyposulfite 0.01 N until complete disappearance of yellow color. Maximum allowable limit of peroxide value in oils is 2 mEq/ kg. Peroxide value is calculated by the following formula:

Peroxide value = $\frac{\text{weight}}{1000} \times \text{Na hyposulfite normality} \times \text{ml volume of Na hyposulfite}$

Measuring of acidity (FFA): Three gram oil weighted in a 250 ml Erlenmeyer flask and 30 ml neutral alcohol (1:1 chloroform/ethanol) was added to it. Titration of solution was done with NaOH (0.01N) solution in the presence of

phenolphthalein indicator until pale pink color appearance.

Acidity = $\frac{\text{weight}}{28.2} \times \text{NaOH normality} \times \text{ml volume of NaOH}$

Results and Discussion

Obtained results showed that 56.92 and 43.07 % of the samples were out of standard limit and not suitable for consumption due to high levels of peroxides and acidity, respectively (Table 1). The lowest and highest peroxide value were 1.1 and 2.9 mEq/kg, respectively. The minimum and maximum acidity of the samples were 0.7 and 2.9 wt%, respectively.

Table 1: Samples acceptable and unacceptable Percentage for consumption

Total samples	Acceptable		Unacceptable	
	Peroxide value (%)	Acidity (weight %)	Peroxide value (%)	Acidity (weight %)
65	43.08	56.93	56.92	43.07

Studies have shown that peroxides can cause different diseases, including atherosclerosis, cancer, premature aging, allergic inflammation, ischemic heart disease, stroke, respiratory distress syndrome, liver disorders and increasing of heavy metals, solvents, pesticides and drugs increases toxicity [10-12].

Obtained results of this study showed that peroxide value of used edible oil to producing Persian doughnuts in Lorestan province of Iran have been higher than standard limit. Oil temperature of doughnuts preparation, frying time, oil type of and its using frequency, antioxidant dose and fryer type are the main factors on peroxidase value. In a study to determine the peroxide value of oils used in restaurants and fast foods retailing centers of Yasouj city, 50 and 70% of used oils were unfavorable, respectively. Peroxide value of 58.3% and 97.3% of the used oils in restaurants and fast foods shops, respectively, were higher than Iranian standard limit [13]. Hadizadeh Saffari and coworkers in a study to determine acidity and peroxide value of used edible oil in Qazvin province during 2005 to 2008 years showed that 29.49, 9.57, 11.86 and 29.49% of samples were out of Iranian standard range, respectively [14].

The most important factor of creating peroxide in Persian doughnuts is oxygen presence; thereby reducing the oxygen concentration is an effective factor to peroxide declining. Different methods can be used to reduce the oxygen concentration in the Persian doughnuts frying, including providing vacuum condition, addition of glucose oxidase to preventing Maillard reaction and oxidation [15]. Copper and ionic utensils, various edible oils, hydrogenated oils and in some cases several times fried oils used for Persian doughnuts producing. Copper or Iron atoms presence in frying utensil cause peroxide content increasing by enhancing fatty acids autoxidation and free radicals formation. Butyric acid, citric acid and fumaric acid can use to enhancing antioxidant effects and inactivation these metals [15]. Studies show significant role of air in fat oxidation and spoilage, so fat and oil must be kept indoors and away from air [16, 17]. Since, oxidants

cause free radical formation in food products and also can cause different diseases in human such as gastrointestinal diseases [18], a lot of studies have proposed using plant antioxidants for reducing the effects of oxidants [19-30].

Conclusion

According to obtained results of this study more researches should be done about traditional frying products due to harmful health risks of peroxide. It seems educational programs about nutrition and using proper method for cooking and frying of foods is necessary. Continuous planning and surveillance, providing practical solutions by health authorities and regulatory organs, training of food staffs, using oils a few times and especial for food frying and using natural antioxidants are recommended to reduce the peroxide content in Zoolbia and Bamieh.

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