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Effect of Sesame Meal on the Physicochemical Characteristics of Pasteurized Butter

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ABSTRACT
Sesame meal is a byproduct of oil extraction factories. This product is considered as waste and it used to feed livestock and poultry. Hence, we evaluated effect of sesame meal methanol extraction on the physicochemical characteristics of pasteurized butter. In this study, oil extraction was performed by methanol at room temperature for 24 h. The compositions determined by HPLC chromatography, also sample of butter were packed with three concentrations of 50, 100 and 150 ppm. Oxidative tests including acid index, anisidine, peroxide, the induction period, total polyphenol compounds, conjugated diene value in 0 days, 15th, 30th, 45th, 60th and 90th of maintenance level (P< 0/05). The results showed that the butter with a concentration of 150 ppm and storage temperature -18 ° C showed highest resistance to oxidative and organoleptic evaluation, also it had significant differences with T1, T2 and T treatments (P< 0.05). The worst example, to control the temperature of 4 ° C. interaction between concentration × time × temperature factors was significant for all treatments (p>0/01).

Introduction

Fats containing higher content of unsaturated fatty acids are susceptible to auto oxidation (Gonzalez et al., 2010). Higher ambient temperatures further speed up the auto oxidation process and reduce the shelf stability of modified fats. Chemical antioxidants like BHA (butylated hydroxyl anisole), BHT (butylated hydroxyl toluene), and TBHQ (tertiary butylhydroquinone) possess excellent antioxidant properties, but the use of synthetic antioxidants from the safety point of view is controversial and questioned by many people. Many researchers have studied the presence of poly phenolic antioxidants in higher plants, which possess strong antioxidant activity (Jeong et al., 2004). These antioxidants have anti carcinogenic and cardio-protective activity. Lipids and lipid-soluble substances that may be susceptible to oxidation are present in almost all foods, and lipid peroxidation plays an important role in the deterioration of foods during storage. In addition, toxic substances formed by lipid peroxidation may lead to other adverse effects such as carcinogenesis, mutagenesis, and aging (Yagi, 1990). The incorporation of antioxidants in fats and oils, orin foods that contain fats and oils, is effectively helpful in retarding the oxidation of lipids. However, there is currently an interest in replacing synthetic antioxidants, which are of safety concern, (Ito et al, 1982), with natural antioxidants. Some chemicals that occur naturally in plants have begun to receive much attention as safe antioxidants, as they have been consumed by people and animals forye ars (Namiki, 1990). Sesame (*Sesamum indicum* L.) is one of the most important oilseed crops, cultivated in India, Sudan, China and Burma, which are the major sesame-producing countries, contributing to 60% of the global yield (Abou-Gharbia et al, 1997). Sesame is a source of edible oil and provides a nutritious food forhuman s. Budowski (1964) noted that sesame oil is highly stable to oxidation compared with otherveg etable oils. Sesame oil is especially stable because of the presence of sesamin, sesamolin, sesaminol, sesamel, g-tocopherol (Fukuda et al, 1986; Shahidi et al., 1997). ln addition, the oxidative stability of sesame oil is dependent on the roasting temperature (Yen & Shyu, 1989). The conventional process forpr eparing sesame oil involves cleaning, optional dehulling, roasting, grinding, cooking, and preparing (Fukuda & Namiki, 1988). So, the aim of this study was evaluation of sesame meal Effect on the physicochemical characteristics of pasteurized butter

Material and method

In this study, lactic pasteurized butter, unsalted, was produced in the New Zealand country. Butter was stored at -10 to -12 ° C and study performed at 0, 15, 30, 45, 60 and 90 days. The first factor used in this study included T: pasteurized butter-control without extract, T1: pasteurized butter contains extracts of sesame meal 50 ppm, T2: pasteurized butter contains extracts of sesame meal 100 ppm, T3: pasteurized butter contains extracts of sesame meal 150 ppm and second factor was storage temperature at -18 and 4° C. Measured characteristics included: acid index (Nadeem, 2013), anisidine (Nadeem, 2013), peroxide (AOAC, 2005), the induction period (Nadeem, 2013), total polyphenol compounds (Kähkönen et al., 1999), conjugated diene value. A randomized complete block design were used for analyze the data. Duncan's multiple range test was performed to comparing the characteristics means.

Result and discussion

Phenolic compounds

Effect of treatment was significant at 1% on the amount of polyphenols. 150 ppm treatment showed highest means for phenolic components (458 mg), and lowest means was obtained by 50 ppm treatments (263mg). A significant decrease was observed in the polyphenolic compounds of

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butter samples after 90 days. Storage temperature also influences significantly the polyphenolic compounds. At -18° C, reduction of phenolic compounds was lower in compare to 4° C storage temperature. Previous reports have shown that polyphenolic compounds are associated with antioxidant activity and play an important role in stabilizing lipid oxidation (Yen et al, 1993).

Acid index

At three concentrations, acid index was increased by increasing of storage period and highest increasing was obtained by control (without extract oil). In other hand, 150 ppm treatment showed lowest acid index in compare to other treatments, after 90 days of storage, lowest and highest index were obtained by T3 and control, respectively. Interaction between extract oil and storage temperature showed that 150ppm at -18° C had best result with lowest oxidation. Similar results were reported by Mohdaly et al. (2011).

Anisidine index

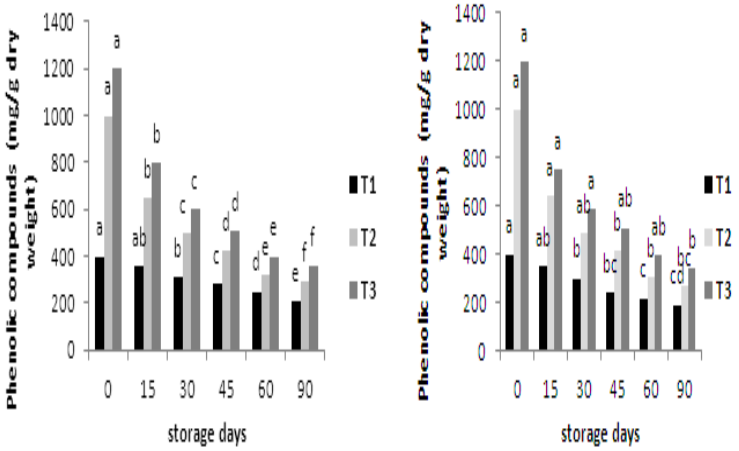
Results for this characteristic showed that, control had highest means but application of 150ppm led to reduction of anisidine at -18° C specially. Also, after 90 days, highest and lowest anisidine were obtained by control and 150 ppm. Graf 3 shows trend of anisidine changes.

Peroxide

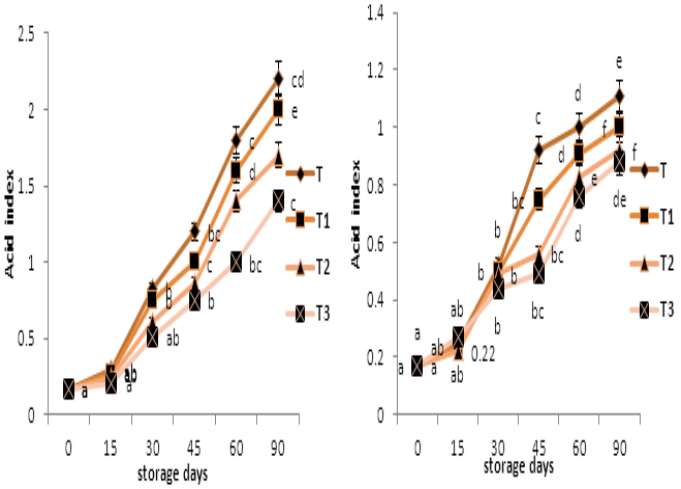
The Graf shows trend of peroxide changes, by application of extract oil, peroxide was lowest in compare to control but peroxide increased by increasing of storage period, in other hand, increasing of peroxide was slower in 150ppm in compare to control. Also significant differences were observed between -18 and 4°C. Mohdaly et al. (2011) studied the impact of Sesaum indicum cake extract on stabilization of sunflower and soybean oils and observed that addition of Sesamum indiucm cake extract was quite useful in the inhibition of hydroperoxides and aldehydes. Zia et al. (2003) studied the effect of ginger extract on oxidative stability of sunflower oil and recorded significantly lower values of peroxides as compared to the control. Anwar et al. (2003) stabilized corn oil with some natural extracts and reported that addition of natural extracts significantly decreased the rise in peroxide value of the experimental samples.

Conjugated diene value

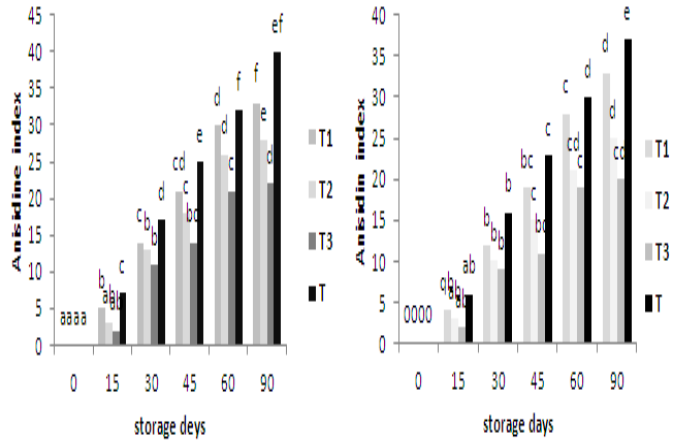
Result showed that highest conjugated diene value was observed at 4°C. Between concentrations, 150ppm had lowest value in compare to control, 50 and 100ppm. The value of Conjugated dienes is a good parameter to assess the oxidative break down in fats and oils (Pritchard, 1991). Conjugated dienes in modified butter oil samples increased during the 90-day storage. The results of conjugated trienes evaluation of fatty acids modified butter oil revealed that oxidation products in the form of conjugable trienes were significantly higher in the control sample as compared to all the treatments. The concentration of conjugated trienes linearly increased in all the treatments and in the control throughout the storage period. Anwar et al. (2006) studied the stabilization of sunflower oil by methanolic and acetonic extracts of *Moringa oleifera* leaves and found that addition of 80% methanolic extract of *Moringa oleifera* leaves decreased the production of conjugated dienes and trienes. On the basis of the results of this study, it is clearly indicated that the butter with a concentration of 150 ppm and storage temperature -18 ° C showed highest resistance to oxidative and organoleptic evaluation, also it had significant differences with T1, T2 and T treatments (P< 0.05). The worst example, to control the temperature of 4 ° C. interaction between concentration × time × temperature factors was significant for all treatments (p>0/01).



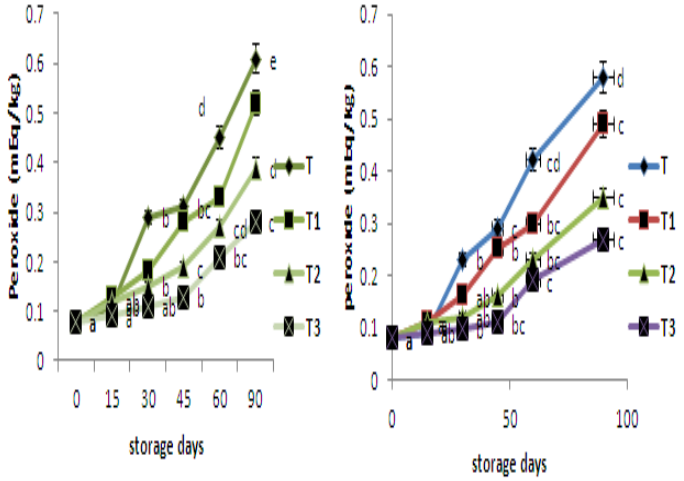
Graf 1. Means comparisons for phenol compounds between extract concentration at -18 (right) and 4° C (left) storage temperatures



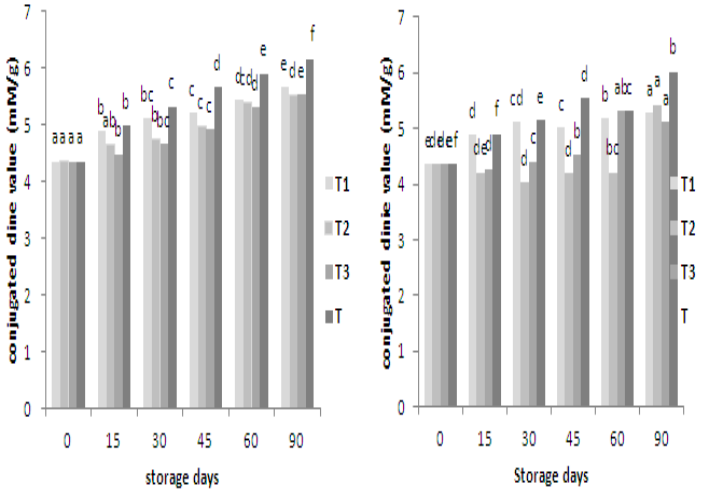
Graf 2. Means comparisons acid index between extract concentration at -18 (right) and 4° C (left) storage temperatures



Graf 3. Means comparisons anisidine index between extract concentration at -18 (right) and 4° C (left) storage temperatures



Graf 4. Means comparisons peroxide index between extract concentration at -18 (right) and 4° C (left) storage temperatures



Graf 5. Means comparisons Conjugated diene value between extract concentration at -18 (right) and 4° C (left) storage temperatures

Resources

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