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Effect on Physico-chemical properties of cookies during storage

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Abstract

Experiments were conducted to development, quality evaluation and storage stability of cookies made from wheat flour, pumpkin flour and pumpkin seed flour. The cookies were formulated by taking different proportion of flours in the ratio of (T₁₀₀) 100:0:0, (T₁) 90:7.5:2.5, (T₂) 80:15:5, (T₃) 70:20:10 and (T₄) 60:25:15 respectively. Wheat flour of the ratio of 100:0:0:0 was considered as control. All the samples were packed in high density polyethylene (HDPE) and stored at room temperature from 0 to 120 days for quality evaluation. After preparation of cookies various physico-chemical properties were determined, i.e., moisture content, ash content, protein content and fat content.

Keywords: Wheat flour, pumpkin flour, pumpkin seed flour, and High density polyethylene

Introduction

Bakery products are ready to eat, suitable and cheap food products carrying digestive and dietary principles of vital importance. The cookies become popular both in rural and urban population in India. These bakery products have about 6-7% proteins. Cookies owing to their long shelf life are considered useful for nutritional enrichment in feeding programs. In recent years, consumption of bakery products has increased in most of countries as they served as important source of nutrients (Ranhotra, 1980) [9]. The main aim of the food industry is to obtain safe food without contaminating elements which can produce diseases or be harmful to human beings. In addition, food must have beneficial physical and psychological effects on people. The consumer must feel at ease at the time of eating knowing that the food is not only palatable but also healthy (Acuna, 2011) [11].

Pumpkin belongs to Cucurbitaceous. Its seeds are good source of fat, protein, carbohydrate and potential source of minerals. In current years pumpkin seeds received substantial attention due to its nutritional value. Its seeds can be used in snacks and its flour can also be used in making low fat food spread (Ivana, 2014) [6]. These seeds can also be supplemented in bread and different bakery products (Elinge, 2012; Mirjana, 2014) [5, 7].

Pumpkin seeds can be used as entire or in the form of flour to supplement the food products. Considering, the nutritional insufficiency and health problems among people in India, the recent study is designed to develop food products with incorporation of pumpkin seeds for nutritional improvement and to assess the chemical composition and sensory framework of augment food products.

Cookies are examined as snacks for people of all age categories. They must be allowable to masses other than having high nutritional quality. Cookies are small, flat, baked treat, normally holding fat, flour, eggs and sugar. The major difference of the pumpkin cookies is lessening quantity of liquid used in the dough preparation (Shakuntala and Shadaksharaswamy, 2007) [10].

Materials and Methods

The experiments were conducted to develop cookies and its physico-chemical quality during storage. Flours comprising wheat flour, pumpkin flour and pumpkin seed flour were used for the present study. The cookies were formulated using various proportions of flours and other ingredients. All the experiments were conducted in food analysis laboratory and bakery laboratory in the Department of Agricultural Engineering. Cookies were packaged in HDPE at room temperature and analyze the physico-chemical characteristics like moisture content, ash content, protein and fat content. The physico-chemical characteristics were done as fresh and as well as during storage for 120 days.

Development of cookies

Cookies were prepared by incorporating different levels of flours *viz.*, wheat flour, pumpkin flour and pumpkin seed flour blends in ratio of (T₁₀₀) 100:0:0, (T₁) 90:7.5:2.5, (T₂) 80:15:5, (T₃) 70:20:10 and (T₄) 60:25:15 respectively. All the materials were mixed by hand until firm dough was formed. The dough was rolled out in a baking tray and cut into round in shape with a mould. The cookies were placed in greased aluminum trays and baked in deck oven. After baked the cookies were taken out of deck oven and cooled at room temperature. At last, the cooled cookies were packed into HDPE bags and stored at room temperature for further studies.

Estimation of Physico-chemical characteristics of cookies

Moisture content, ash content, protein content and fat content were determined in all the five types' ratio of cookies.

Moisture content

Moisture content of noodles was determined by hot air oven method. Following formula was used to estimate moisture content of samples.

$$\text{Moisture content (wb\%)} = \frac{\text{Loss in weight of sample}}{\text{Initial weight of sample}} \times 100$$

Ash Content

Muffle furnace (TANCO model) was used to determine the ash content of the samples. Following formula was used to calculate the ash content of the samples.

$$\text{Ash content (\%)} = \frac{\text{Final weight of ash}}{\text{Initial weight of sample}} \times 100$$

Protein estimation

Protein was analytically estimated by determining the amount of total nitrogen in the sample (AOAC, 2012)^[4].

$$\text{Amount of protein in sample} = \text{total nitrogen (\%)} \times 6.25$$

Fat Estimation

Fat was estimated using the formula:

$$\text{Fat content (\%)} = \frac{\text{weight of residue left}}{\text{weight of sample taken}} \times 100$$

Result and Discussions

The studies were conducted on development and quality evaluation of cookies by incorporating various proportions of flours. e.g., wheat flour, pumpkin flour and pumpkin seed flour. The quality of the fresh cookies were evaluated on the basis of physico-chemical characteristics like moisture content, ash content, protein content and fat content.

Effect on moisture content

The data for variation in moisture content (%) of cookies during storage is shown in Fig.1. The moisture content of cookies samples varied from 2.10 to 2.37% of fresh as well as during storage periods. The values of moisture content for freshly prepared cookies was highest for T₄ cookies (2.15%) followed by T₃ (2.14%), T₂ (2.13%), T₁ (2.12%), and T₀ (2.10%) respectively. The moisture content of incorporated flour cookies had higher as compared to control cookies and it was increased with increased in the incorporation of pumpkin

flour and pumpkin seed flour in wheat flour. The moisture content ranged for cookies T₀ (2.10 - 2.28%), T₁ (2.12 - 2.30%), T₂ (2.13 - 2.34%), T₃ (2.14 - 2.35%) and T₄ (2.15 - 2.37%) during storage. Highest moisture content observed in T₄ cookies as compared to other during storage. Whereas, T₀ cookies reported lowest moisture content. Similar trends were found by Mustafa *et al.*, (1986)^[8] that increase in moisture content with increase the ingredients.

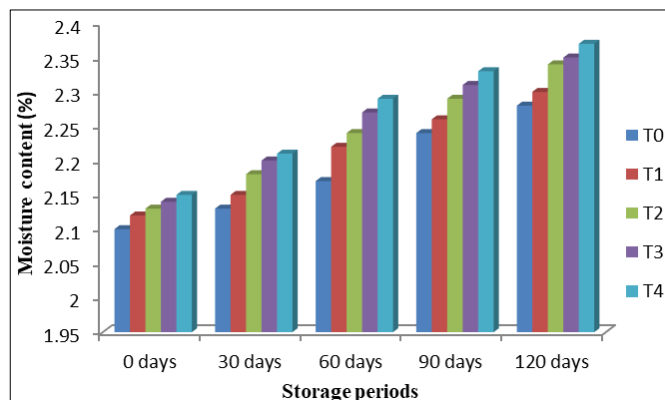


Fig 1: Effect on moisture content (%) of cookies during storage periods

2. Effect on Ash Content

The data for variation in ash content (%) of cookies during storage is shown in Fig.2. The ash content of cookies samples varied from 0.97 to 1.79% with respect to incorporation of flours. The values of ash content for freshly prepared cookies was highest for T₄ cookies (1.79%) followed by T₃ (1.54%), T₂ (1.38%), T₁ (1.15%), and T₀ (0.97%) respectively. The ash content of incorporated flour cookies had higher as compared to control cookies and it was increased with increased in the incorporation of pumpkin flour and pumpkin seed flour in wheat flour. The ash content ranged for cookies T₀ (0.97 - 0.90%), T₁ (1.15 - 1.06%), T₂ (1.38 - 1.28%), T₃ (1.54 - 1.45%) and T₄ (1.79 - 1.70%) during storage periods. Highest ash content observed in T₄ cookies as compared to other during storage. Whereas, T₀ cookies reported lowest ash content. Similar trends were found by Agu *et al.*, (2007)^[2].

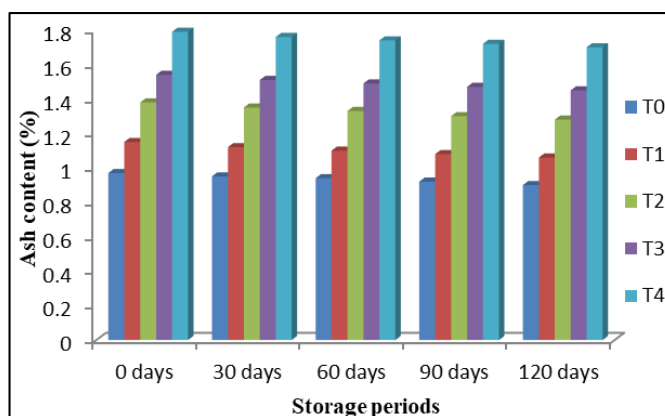


Fig 2: Effect on ash content (%) of cookies during storage periods

Effect on Protein Content

The data for variation in protein content (%) of cookies during storage is shown in Fig.3. The protein content of freshly prepared cookies were observed for cookies T₀ (7.32%), T₁ (8.44%), T₂ (9.86%), T₃ (10.59%) and T₄ (11.83%)

respectively. The protein of cookies decreased with increase in the storage period for cookies T₀ (7.32 - 7.20%), T₁ (8.44 - 8.33%), T₂ (9.86 - 9.76%), T₃ (10.59 - 10.45%) and T₄ (11.83 - 11.68%) during 120 days of storage periods. Highest protein observed in T₄ cookies as compared to others during storage. Whereas, T₀ cookies reported lowest protein content. Similar trends were found by Agu *et al.*, (2007) [2].

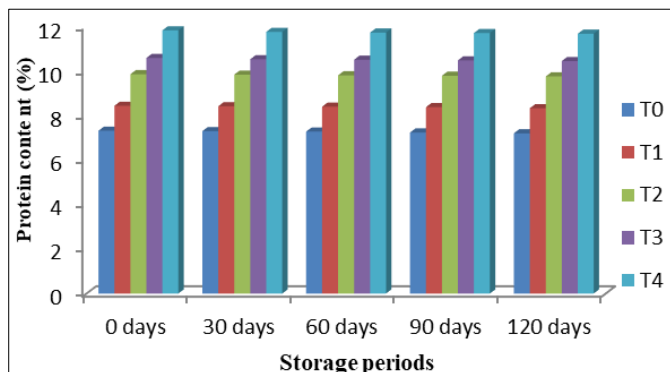


Fig 3: Effect on protein content (%) of cookies during storage periods

Effect on Fat Content

The data for variation in fat content (%) of cookies during storage is shown in Fig.4. The fat content of freshly prepared cookies were observed for cookies T₀ (21.70%), T₁ (22.83%), T₂ (22.87%), T₃ (22.92%) and T₄ (22.98%) respectively. Highest fat observed in T₄ cookies as compared to other during storage. Whereas, T₀ cookies reported lowest fat content. The results revealed that the fat content of cookies increased with increase in the incorporation of pumpkin flour and pumpkin seed flour in wheat flour. The fat content were observed for T₀ cookies (21.70 - 21.57%) followed by T₁ (22.83 - 22.72%), T₂ (22.87 - 22.76%), T₃ (22.92 - 22.82%) and T₄ (22.98 - 22.89%) up to 120 days of storage periods. The study revealed that fat content gradually decreased as increased in storage period under room condition. The fat content of cookies incorporated pumpkin flour and pumpkin seed flour with wheat flour was observed higher as compared to control cookies. Similar trends were found by Anu *et al.*, (2007) [2].

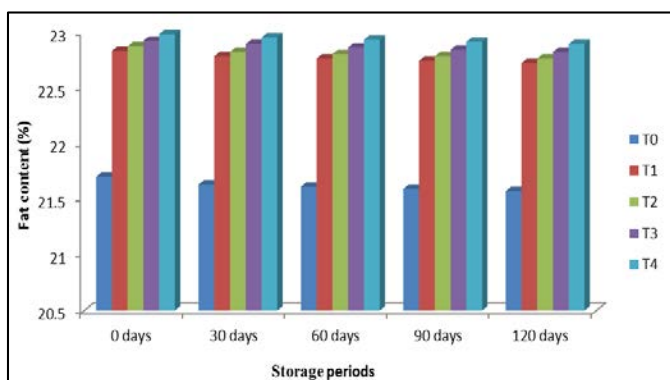


Fig 4: Effect on fat content (%) of cookies during storage periods

Conclusion

Incorporation of pumpkin flour and pumpkin seed flour into wheat flour for the development of cookies is possible based on the physico-chemical properties of the cookies. The results revealed that the incorporated cookies had the highest physico

chemical properties during the storage compared to control cookies. Therefore, the treatment (T₄) has highest physico chemical properties for 120 days stored at room temperature.

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