Development and standardization of pumpkin (Cucurbita maxima) incorporated cookies

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Abstract
The present study was carried out with objective of utilizing nutrient rich pumpkin to develop cookies. The pumpkin was incorporated into the cookies in the form powder and puree in different proportions. Pumpkin was pre-processed, dried and powdered. Pumpkin powder was replaced with wheat flour in 10, 20 and 30 percentage as A1, A2 and A3 respectively. The pumpkin puree was also replaced with wheat in 10, 20 and 30 percentage as B1, B2 and B3. Sensory analysis was done by trained panel by 9 point hedonic scale. Pumpkin powder incorporated cookies had high overall acceptability compared pumpkin puree cookies. A2 was found to be highly acceptable with significant difference. Proximate analysis was carried out for all the samples. The proximate analysis showed moisture 1.72 ± 0.025, ash 1.32 ± 0.025, protein 8.65 ± 0.06, fat 22.94 ± 0.015, carbohydrate 60.67 ± 0.03 and fiber 2.55 ± 0.03.

Introduction
Pumpkin (Cucurbita maxima) is annual climber, belonging to cucurbitacae family. It is cultivated in many countries like Mexico, Argentina, India, China and also in some parts of Europe. Popular species of pumpkin are C. Maxima, C. Moschata and C. Pepo. In India most of the cultivated species belongs to C. maxima. It is known for its edible fruit, seed and greens (Stovel, 2005) [4]. Fruit is used as vegetable and used in preparation of squashes. Seeds are used in the preparation of sweets or consumed as snacks.

In parts of the world pumpkin is used as herbal medicine because of its biologically active components. Pumpkin is rich in carotenoids, polysaccharides, oils, sterols, para amino benzoic acid and good amount of vitamins and minerals. Pumpkin seeds are of high protein, low in fat content and they are good source of elements like Potassium Magnesium, Copper, Zinc, Selenium and Molybdenum (Elinge et al., 2012) [5]. The phyto-constituents of pumpkin make it vital in different types of diet. Pumpkin has anti-diabetic, anti carcinogenic, antimicrobial and antioxidant properties. (Mukesh et al., 2012). All these benefits made it essential to include in our daily diet. Large size of fruit is a major limitation, to overcome this many processing methods like drying or dehydration are applied to make flour. (Akpinar and Bicer, 2006) [6]. The bio availability is increased by drying as it breaks up cellular structure and emulifies carotenoids. In bakery products to replace the nutritional and sensory properties of wheat flour other fiber sources can be supplemented. (Stanley, 2006) [7]. The objective of this study to develop cookies by replacing the wheat flour with pumpkin puree and pumpkin flour in different proportions and to carry out proximate analysis of developed product. The demand for the bakery products is increasing in which cookies have special place. To meet sensorial and nutritive expectation of the customers, these cookies are being developed and standardized.

Materials and Methods
Sources of raw material and preparation
Raw materials used were purchased from local market of Bodhan. Pumpkin was selected based on soundness, cleanliness, free from pest damage or mechanical damage. (Gupta, 2004) [8]. The peel and seeds were removed. The peeled pumpkin was cut into cubes of small size and blanching was done by using hot water.

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Cubes were dried to about 3-4% (db) moisture content. Grinding was done using a domestic grinder for 1 minute. The powder was sieved using 140 mesh sieve and packed in aluminum polythene laminated pouches. Other ingredients wheat flour, hydrogenated vegetable oil, salt, sugar were purchased from local market.

**Formulations for the Preparation of Pumpkin Powder Cookies**

**Development and standardization of pumpkin incorporated cookies**

Different proportion of pumpkin powder and puree was incorporated into the cookies and standardization was done.

**Table 1:** Formulation for control cookies

| Ingredients       | Quantity (g) |
|-------------------|--------------|
| Wheat flour       | 100          |
| Sugar             | 50           |
| Shortening        | 60           |
| Baking powder     | 0.5          |
| Egg               | 10           |

**Table 2:** Formulation for pumpkin powder incorporated cookies

| Ingredients       | Quantity (in gram) |
|-------------------|--------------------|
| Wheat flour       | A1: 90, A2: 80, A3: 70 |
| Pumpkin powder    | 10, 20, 30         |
| Sugar             | 50, 50, 50         |
| Shortening        | 60, 60, 60         |
| Baking powder     | 0.5, 0.5, 0.5      |
| Egg               | 10, 10, 10         |

**Table 3:** Formulation for pumpkin puree incorporated cookies

| Ingredients       | Quantity (in gram) |
|-------------------|--------------------|
| Wheat flour       | B1: 90, B2: 80, B3: 70 |
| Pumpkin puree     | 10, 20, 30         |
| Sugar             | 50, 50, 50         |
| Shortening        | 60, 60, 60         |
| Baking powder     | 0.5, 0.5, 0.5      |
| Egg               | 10, 10, 10         |

**Experimental procedure**

1. Creaming (shortening + sugar)
2. Folding
3. (Pumpkin puree + baking powder)
4. Mixing with wheat flour rolling
5. Baking at 180°C for 20 min
6. Cooling (at room temperature)
7. Packaging
8. Storage

**Sensory evaluation for pumpkin powder and pumpkin puree incorporated cookies**

Pumpkin powder and puree incorporated cookie samples A1, A2, A3, B1, B2 and B3 were given to the control panel members along with control sample for analyzing organoleptic properties. Based on the 9 point hedonic scale semi trained panelist evaluated the samples based on the color, flavor, appearance, texture and overall acceptability. (Amerine MA, 1967)

**Table 4:** Proximate composition of pumpkin powder incorporated cookies

| Parameters        | A1             | A2             | A3             |
|-------------------|----------------|----------------|----------------|
| Ash               | 1.62 ± 0.03    | 1.72 ± 0.025   | 1.81 ± 0.037   |
| Moisture          | 2.9 ± 0.03     | 3.24 ± 0.025   | 3.35 ± 0.025   |
| Protein           | 8.40 ± 0.04    | 8.65 ± 0.06    | 8.84 ± 0.04    |
| Fat               | 22.94 ± 0.03   | 22.94 ± 0.015  | 23.12 ± 0.02   |
| Carbohydrate      | 62.74 ± 0.025  | 60.67 ± 0.03   | 59.83 ± 0.035  |
| Fiber             | 1.37 ± 0.015   | 2.55 ± 0.03    | 3.04 ± 0.02    |

Values are expressed as mean ± standard deviation
Table 5: Proximate composition of pumpkin puree incorporated cookies

| Parameters     | A1       | A2       | A3       |
|----------------|----------|----------|----------|
| Ash            | 1.77 ± 0.01 | 1.79 ± 0.02 | 1.8 ± 0.01 |
| Moisture       | 2.57 ± 0.02 | 2.56 ± 0.02 | 2.57 ± 0.02 |
| Protein        | 9.28 ± 0.26 | 9.5 ± 0.06  | 9.57 ± 0.07 |
| Fat            | 12.18 ± 0.29 | 11.98 ± 0.02 | 11.56 ± 0.30 |
| Carbohydrate   | 75.07 ± 0.02 | 74.85 ± 0.04 | 74.16 ± 0.03 |
| Fiber          | 0.93 ± 0.02  | 0.96 ± 0.01  | 0.98 ± 0.01  |

Values are expressed as mean ± standard deviation

Conclusion

In this study the pumpkin powder and puree incorporated cookies were developed and standardized, which have high nutritive value. Based on the sensory evaluation the pumpkin powder incorporated cookies were having optimum sensorial characteristics compared to pumpkin puree incorporated cookies. A2 which is having 80:20 ratios of wheat flour and pumpkin powder was superior. By this replacement the gluten content and glycemic index is lowered where protein and fiber content was increased.

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