



STANDARDIZATION OF BASIL POWDER INCORPORATED COOKIES

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Abstract

Ocimum sanctum (Holy Basil) is one of the roughly 60 species of the Genus *Ocimum*, the basil genus which consists of aromatic herbs. Basil contains hundreds of beneficial compounds known as phyto-chemicals. Basil is rich in antioxidants and is recommended to guard against free radicals and protect from damaging excess oxidation. Keeping all these points under consideration the present study was carried out to standardize the basil powder incorporated cookies. Three different flavored (Vanilla, Strawberry and Pista) cookies were formulated using the basic ingredients with different proportions of basil powder at a level of 1%, 2%, 3%, 4% and 5% respectively. Out of these, five per cent basil powder incorporated vanilla cookies secured the highest score for acceptability and it was selected for packaging and storage studies. They were stored in three different packaging materials viz., 200 and 400 Gauge polyethylene bags (P_1 and P_2) and Metallized polyester polyethylene laminated pouches (P_3). The storage stability was studied initial (0 day) and final day (30 days) of the acceptability of the product. The nutrient content of the developed products were analyzed and it contains 485.25 K.Cal of energy, 11.69g of protein, 27g of fat, 2.2g of dietary fibre, 14.4mg of Vitamin-C, 230.12 μ g of β -carotene, 66.30 μ g of lycopene, 10.82mg of iron, 160mg of phosphorus and 162mg of calcium. The results revealed that there was a significant change in energy, protein, fat, β -carotene, lycopene and vitamin C content during storage. There was non-significant change in crude fibre and mineral (calcium, iron and phosphorus) content of the products during storage period.

Keywords : Basil Leaves, Standardization, Cookies, Children, Medicinal Herbs.

Introduction

India with its vast geographical diversity inhabits about 17,000 species of higher plants and among that 7500 are known for its medicinal properties. These plants are prominent in the regions of Eastern Himalayas, Western Ghats and Andaman and Nicobar Island (Shiva, 1996). Medicinal plants are considered to be very rich sources of secondary metabolites which are of therapeutic importance. They are the most exclusive source of life-saving drugs for majority of world's population (Tang *et.al.*, 2012). *Ocimum sanctum* Linn, a traditional medicinal plant, widely known across South Asia is commonly used in Ayurvedic medicines. *Ocimum tenuiflorum* also known as *Ocimum sanctum*, Holy Basil or Tulsi is an aromatic plant in the family Lamiaceae which is native to South Asia and widespread as a cultivated plant throughout the Eastern world tropics (Kristiansen, 1999). Botanically known as *Ocimum sanctum* Linn, and commonly as Tulsi, is the sacred plant of India and also known by various names as Tulassi, Manjari, Krishna Tulsi, Trittam, Tulshi and Thulsi. In English it is called as Holy Basil (Gupta and Prakash, 2002).

The plant of holy basil has many medicinal properties which include adaptogenic, anti-bacterial, anti-depressant, anti-oxidant, anti-viral, carminative, diuretic, expectorant, anti-inflammatory, immune-supporting and metabolic enhancer. It also has anti-convulsant, anti-fertility, anti-microbial, anti-diabetic and radioprotective properties (Prasad and Sagar, 2012). There are many active constituents of Holy Basil such as alkaloids, ascorbic acid, β -carotene, α -ocimene, β -ocimene, carvacrol, cineole, several essential oils, linalool, linoleic acid, eugenol, glycosides, methyl-chavicol, phenols, saponins, tannin, stearic acid, calcium, iron and selenium (Bakkali *et.al.*, 2008). Fresh basil is a good source of minerals and phytochemicals. Drying of herbs increases its nutritive content and it is one of the methods of preserving herbs.

Processed foods are mainly the food products which attract the children through TV programs. In a detailed study of 367 products, it was discovered that nine out of ten regular food items aimed specifically at children have a good nutritional content (Joshi, 2008). Bakery products are an important part of a balanced diet and a wide variety of such products can be found on shops. They are generally made up of ingredients which yield high energy value such as refined flour, sugar, fat (Smith *et.al.*, 2014). Cookies are cereal based products, accepted by all kinds of population especially children. Keeping all these points under consideration the present study was carried out with the following objectives.

1. To standardize the basil powder incorporated cookies.
2. To find out the acceptability of the standardized products.
3. To analyze the nutrient content and storage behavior of the developed products.

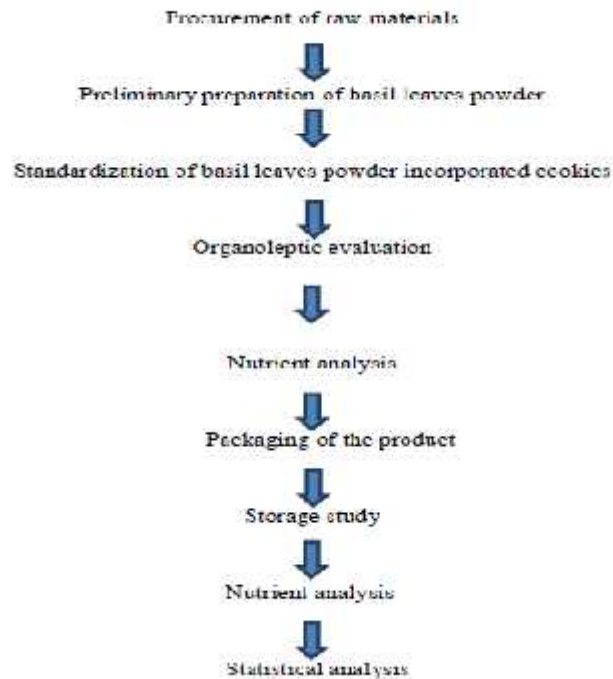


Methodology

The design adopted for the standardization of basil powder incorporated cookies is given in Figure 1.

Figure 1

Flowchart for the standardization of basil powder incorporated cookies



Preliminary preparation of basil powder

Basil with light green colour leaves were used for the preparation of cookies. Basil leaves were separated from the stalk and it was cleaned and dried in the shade for 6 days. Then it was ground into fine powder by using mixie. Different flavoured cookies were prepared by using basil powder at the proportion of 1%, 2%, 3%, 4% and 5% respectively. The flowchart for the preparation of basil leaves powder is given in Figure 2 and the basil powder is given in Plate 1.

Figure 2

Flowchart for the preparation of basil powder





Plate 1, Basil leaves and its powder



Formulation of basil leaves powder incorporated cookies

Three different flavoured cookies were formulated using the basic ingredients such as refined flour, vanaspati, Icing sugar, Baking powder incorporated with different proportions of basil powder (1%, 2%, 3%, 4% and 5%) respectively. The flowchart for the preparation of basil powder incorporated three different flavoured cookies is given in Figure 3.

Basil powder incorporated pista cookies

Basil powder incorporated vanilla cookies

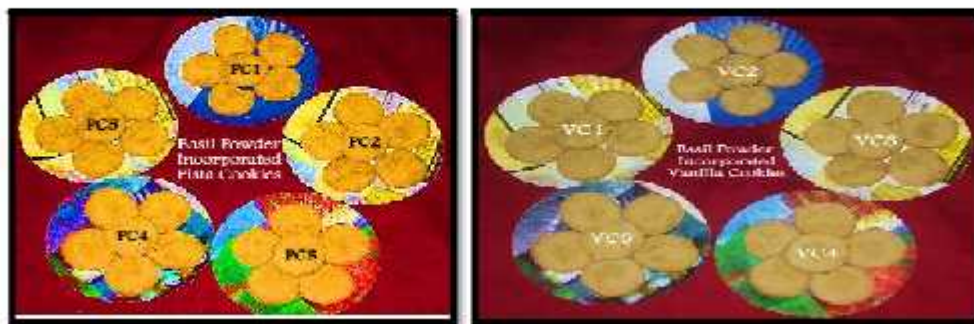
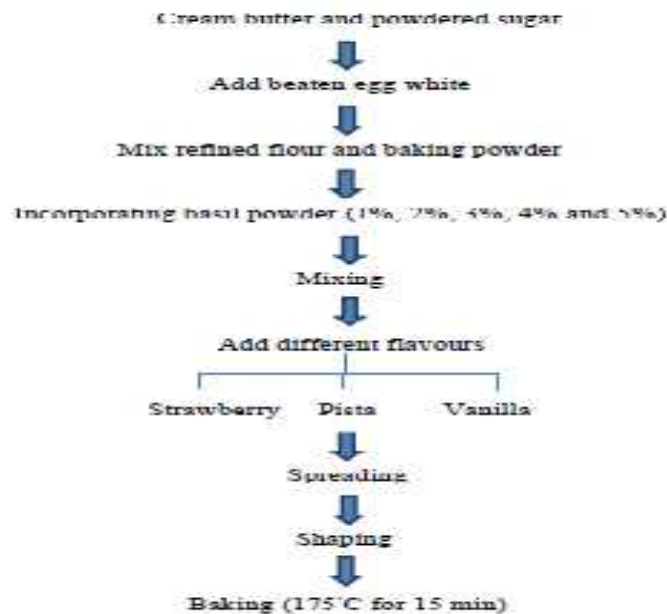




Figure 3
Flowchart for the preparation of basil powder incorporated cookies



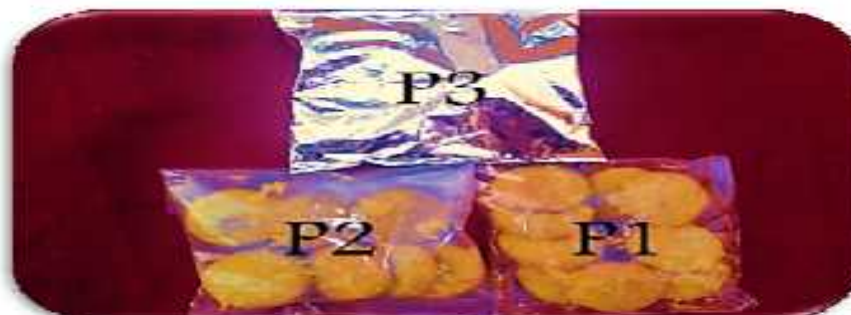
Organoleptic evaluation

When the quality of a food product is assessed by means of human sensory organs, the evaluation is said to be sensory or subjective or organoleptic. (Srilakshmi, 2009). Three different flavoured basil powder incorporated cookies at a level of 1%, 2%, 3%, 4% and 5% respectively was evaluated by a panel of judges using score card with five point hedonic scale rating . Among all the variations, five per cent basil powder incorporated vanilla cookies secured the highest score for acceptability and it was selected for packaging and storage studies.

Packaging and storage studies

Five per cent basil powder incorporated vanilla cookies were selected for packaging studies. They were stored in three different packaging materials viz., 200 and 400 Gauge polyethylene bags (P₁ and P₂) and Metallized Polyester Polyethylene laminated pouches (P₃). The changes in the nutrient content and organoleptic evaluation of five per cent basil powder incorporated vanilla cookies were analysed during storage .

Five Per Cent Basil Powder Incorporated Vanilla Cookies In Different Packaging Materials



P1- 200 gauge polyethylene bag

P2-400 gauge polyethylene bag,

P3-Metallized polyester polyethylene laminated pouches



Nutrient Analysis:The nutrients viz., energy, protein, fat, dietary fibre, Vitamin C, lycopene, carotene, iron, phosphorus and calcium were analysed in the 5 per cent basil powder incorporated vanilla cookies at periodic intervals of storage.

Statistical analysis:The sensory evaluation and nutrient analysis of the basil leaves incorporated vanilla cookies during storage was tabulated and statistically analyzed by using 'ANOVA'.

Results and Discussion

Acceptability of basil powder incorporated cookies

The overall mean scores obtained for the acceptability of five per cent basil powder incorporated cookies were given in Table 1.

Table 1. Overall acceptability of basil powder incorporated cookies

Different flavored cookies	Overall mean scores
Strawberry	4.4
Pista	4.1
Vanilla	4.8

From the above table, it was concluded that among all the three flavoured basil powder incorporated cookies, five per cent basil powder incorporated vanilla cookies secured highest scores in all the sensory attributes and it was used for the storage study which was packed in three different packaging materials and kept under ambient conditions of storage. The storage stability was studied between initial and final day of the acceptability of the vanilla cookies.

Changes in the chemical constituents of basil powder incorporated vanilla cookies during storage

The changes in the chemical constituents of basil powder incorporated vanilla cookies during storage is given in Table 2.

Table 2 . Changes in the chemical constituents of basil powder incorporated vanilla cookies during storage

Chemical Analysis	Initial (0 Day)	Final (30 days)			F ratio
		P1	P2	P3	
Moisture (g)	5.8	6.4	6.2	5.9	0.236*
Energy(K.cal)	485.25	485.10	485.16	485.20	0.048*
Protein (g)	11.69	11.35	11.43	11.53	0.117*
Fat(g)	27.0	25.4	26.0	26.5	0.021*
Crude Fibre(g)	2.20	2.20	2.20	2.20	0 ^{NS}
Vitamin C (mg)	14.40	13.20	13.70	14.20	0.381*
- carotene (µg)	230.12	208.54	216.42	228.26	0.450*
Lycopene (µg)	66.30	60.50	62.25	64.12	0.179*
Calcium(mg)	162.0	162.0	162.0	162.0	0 ^{NS}
Iron (mg)	10.82	10.82	10.82	10.82	0 ^{NS}
Phosphorus(mg)	160.0	160.0	160.0	160.0	0 ^{NS}

*-significant at 5% level

^{NS}-Non-significant at 5% level

The initial moisture content of the basil incorporated vanilla cookies was 5.8g per 100g. The final moisture content was 5.9g per 100g in P₃ which was observed to have minimum moisture permeability compared to P₂ and P₁. This indicates that differences in packaging material significantly increased moisture uptake during storage. A minimum reduction was noticed in the energy content of sample packed using different packaging materials during the storage period. The protein and fat content of the sample declined gradually during the storage period and the decrease in protein and fat content was minimum in P₃ compared to the other packaging materials(P₁ and P₂). There is no change in the crude fibre content in the basil powder incorporated vanilla cookies stored in different packaging materials. Initial crude fibre content of basil powder incorporated vanilla cookies was 2.2g per100g and no change was observed during storage. The initial Vitamin C content of five per cent basil powder incorporated vanilla cookies was 14.4mg per100g. The final Vitamin C content was decreased to 13.2, 13.7 and 14.2mg per 100g respectively. A minimum reduction in the carotene and lycopene content was obtained in all the samples packed using different packaging materials during storage period. The initial carotene content was 230.12 µg per100g and finally it was decreased to 208.54, 216.42 and 228.26µg per 100g in P₁, P₂ and P₃ respectively. It was noted that there was no significant changes in the mineral content (calcium, iron and phosphorus) of five per cent basil powder incorporated vanilla cookies during storage period in the three different packaging materials.



Changes in the overall mean scores of five percent basil powder incorporated vanilla cookies during storage

The overall mean scores obtained for the five per cent basil powder incorporated vanilla cookies are given in Table 3.

Table 3. Changes in the overall mean scores of five per cent basil powder incorporated vanilla cookies during storage

Packaging materials	Vanilla cookies		F ratio
	Initial (0 day)	Final (30th day)	
P1	4.8	3.4	0.201*
P2	4.8	3.6	
P3	4.8	4.4	

*-Significant at 5% level

P1 – 200 gauge polyethylene bag

P2 – 400 gauge polyethylene bag

P3 – Metallized polyester polyethylene laminated pouches .

The initial overall mean scores for five per cent basil powder incorporated vanilla cookies was 4.8 and the final score was decreased to 3.4, 3.6 and 4.4 in P₁, P₂ and P₃ respectively. The effect of packaging materials revealed that the cookies stored in P₃ has higher sensory scores compared to the cookies packed in P₂ and P₁. At the end of the storage period, five per cent basil powder incorporated vanilla cookies packed in MPP (P₃) was acceptable but the cookies packed in P₂ and P₁ was not good and it was not acceptable. Statistical analysis of data revealed that there was a significant difference between packaging materials and storage period.

Conclusions

Medicinal properties of Tulsi (*Ocimum sanctum* Linn) are known for thousand years to various civilizations of the world. *Ocimum sanctum* contain several bioactive compounds may contribute to the health effects and are easily available for consumption to increase the nutritional status as well as act as safe guarding against possible deficiencies. At this juncture it is the responsibility of the nutritionist to bring out newer formulations of incorporated products by using basil powder. The basil powder incorporated cookies was evaluated for its sensory qualities and nutrient content. From this study ,it was concluded that based on this acceptability trial, five per cent basil powder incorporated vanilla cookies was used for the storage study and it was packed in different packaging materials and kept under ambient conditions of storage.

Among the packaging materials, the sample stored in P₁ absorbed more moisture followed by P₂ and P₃. It was concluded that MPP (P₃) was the best packaging material. There was a decline in the energy, protein, fat, VitaminC , carotene and lycopene content of five per cent basil powder incorporated vanilla cookies during the storage period and the loss was minimum in metalized polyester polyethylene laminated pouches (P₃) compared to 200 and 400 gauge polyethylene bags (P₁ and P₂). The study clearly shows that MPP (P₃) was found to be significantly superior to the other packaging materials in minimizing losses during storage. It was concluded that during storage period, the crude fibre and mineral content (calcium, iron and phosphorus) were not reduced in all the packaging materials. The effect of packaging materials revealed that five per cent basil powder incorporated vanilla cookies stored in P₃ had higher sensory scores compared to the cookies stored in P₂ and P₁.

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