

Development and Quality Evaluation of Cookies Fortified with Flaxseed Flour

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Abstract: The fortification of flaxseed at different levels were assessed on the nutritional and sensory quality of cookies. The flaxseed as functional ingredient, roasted flaxseed flour (RFF) was incorporated by substituting refined wheat flour at 5%, 10%, and 15%, in cookies formulations. 15% flaxseed flour incorporated cookies were found to be more acceptable than other by sensory evaluation. A novel fortified Cookies was successfully produced and it was observed as the concentration of flaxseed increased the moisture, fat, ash, protein showed gradual increase where as dietary fibre showed a rapid increase and however, carbohydrate content was decreased. Flaxseed is mainly considered as oilseed crop. Moreover, the other nutritional parameters than its oil content, make it more favourable choice for food technologist to develop functional foods. Fiber content was more in flaxseed flour cookies. The Flaxseed richest sources in alpha-linolenic acid, oil and lignans. Flaxseed is an essential source of high quality protein and soluble fiber and has considerable potential as a source of phenolic compounds. The objective of this study was acceptability of cookies containing four different combinations of powders of wheat and flaxseed viz. 95:05, 90:10, 85:15, , percent were used to prepare 100g flour mix.

Keywords: roasted flaxseed flour (RFF), incorporated, Fiber, lignans, alpha-linolenic acid

1. Introduction

The bakery products, cookies are most significant. These are an important food product used as snacks by children and adults in India. However these are most commonly relished by school going children, who need more protein per unit body weight than adults. Cookies hold an important position in snack foods due to variety in taste, crispiness and digestibility. These are popular among all age groups especially in children. Commercially available cookies are prepared from white flour that is nutritionally inferior to whole wheat flour.

Flaxseed also named as Linseed, is an important oilseed crop. The botanical name of flaxseed is (*Linum usitatissimum*). Flaxseeds are flat, oval and pointed at one end, seed of different varieties ranges in colour from light to dark reddish brown or yellow. It is coloured with sticky coating (mucilage) that gives it a high shine and is sticky when wet. (Whistler and BeMiller, 1993)

The flaxseed is rich in Omega-3 and Omega-6 fatty acid which was helpful in lowering serum cholesterol and triglycerides, significantly flaxseeds contain over 20 per cent proteins and can be added to cereals as nuggets to provide crunchy texture (Srivastava, 2007). Flaxseeds contain high levels of dietary fibre including lignans, an abundance of micronutrients and omega-3 fatty acids.

Flaxseed is a rich source of dietary. Soluble fiber and other components of flaxseed fraction could potentially affect insulin secretion and its mechanism of action in maintaining plasma glucose homeostasis. Lignans have antioxidant activity and thus may contribute to the anticancer activity of flaxseed (Prasad, 1997; Yuan et al., 1999; Kangas et al., 2002).

Incorporating flaxseed into a diet is simple and can add a tasty twist to routine dishes. The small, radish brown whole seeds have a nutty taste and can be sprinkled over salads, soups, Yoghurt or cereals. Whole or ground flaxseed can replace some of flour in bread, muffin, pancake and cookie recipes. Flaxseed can be added to baked products as a whole seed, imparting a healthy appearance and increased texture quality. However, flaxseed can be ground (milled) prior to consumption to obtain the potential health benefits from the Omega-3 fatty acids and lignans. Flaxseed is high in mucilage (gums) that can increase the water absorption properties of the dough, which can impact mixing time and dough handling characteristics.

Nutritive value of flaxseed

Water	6.96 g
Energy	534 kcal
Total fat	42.16 g
Protein	18.29
Fiber	27.3
Total Sugar	1.55 g
Total Saturated fatty acids	3.663
Total MUF	7.527g
Total PUF	28.730 g

(USDA April 2018)

2. Methodology

Cleaning

The wheat, bajara grains were taken and cleaned to remove the stones, dust, woods and any other foreign materials from the grains.

Collection of raw material:

Flour, flaxseed flour, baking powder, and sugar were purchased from local market of Nashik.

Preparation of flaxseed flour:

The flaxseed was purchased in local market of Nashik, Cleaned, roasted and grinding was done with the help of grinder to make flaxseed flour.

Preparation of cookies:

Sieve the refined wheat flour and Flaxseed flour, mix them. Powdered sugar added into buter, this process is known as creaming or blending. Then slowly add mixed flour with baking powder. The dough was produced by proper kneading with hands. Rolling ball of dough on wooden plat form made sheets. These sheets were cut by hand operated mold. And baking them 160 0 C for 15 to 20 min. Then cool these cookies at room temp and then packaging.

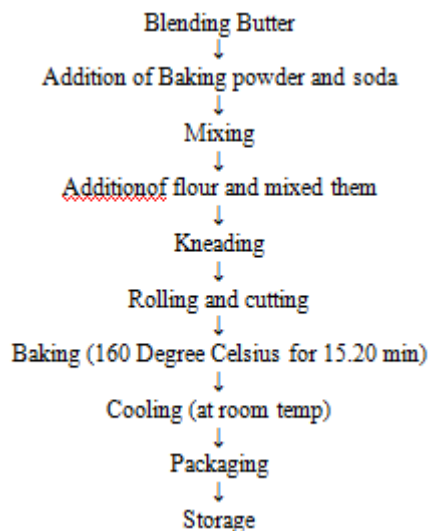


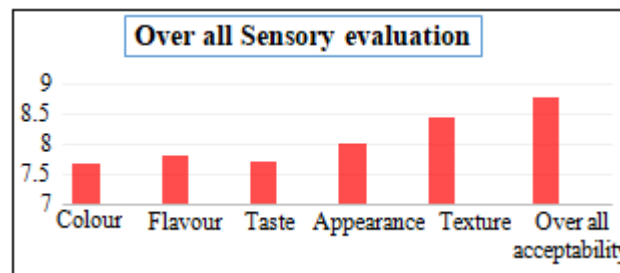
Figure 1: Flow diagram for preparation of flaxseed Cookies

Formulation of Cookies Sample

Ingrident	Weight in gm
Refined Wheat Flour	85
Flaxseed Flour	15
Powder Sugar	30
Brown Sugar	20
Butter	50
Baking Powder	0.5
Baking Powder	0.5
Vanilla Essence	05 Drops

Sensory Evaluation of Cookies

Sensory evaluation of the sample was carried out by trained sensory panel member using nine point's hedonic scale. Attributes like taste, colour, appearance, flavour and overall acceptability was scored based on its intensity scaled. 9-Point Hedonic Scale has been used for the purpose. The sensory score given by the panel have been evaluated for the sensory result. The result of sensory analysis are given below in graph.



Chemical Analysis

The result of chemical analysis shown in Table B. Moisture was determined as per method of A.O.A.C. (1975). Total protein was determined by micro Kjeldhal method according to A.O.A.C. (1975). The fat content was determined by the method of A.O.A.C. (1975) using soxhlet apparatus. Crude fibre was determined by using A.O.A.C. (1975) method. For Ash estimation samples were kept in muffle furnace at 550°C for 6 hr.

Chemical Analysis cookies

Energy	497 Kcal
Carbohydrate	61 gm
Protein	13.4 gm
Fat	22.2 gm
Moisture	2.21 %

3. Conclusion

A novel cookies product, fortified with flax seed was successfully produced. Flax seed increased the protein, ash, fat, fibre and dark colour of the cookies. The moisture was slightly increased in the fortified samples. The colour of the fortified samples attained more dark colour as the fortification was increased. However, the texture was slightly decreased with fortification but described no undesirable change. On the basis of nutritional and sensory quality, cookies when fortified with blends of 15% flax seed resulted in better quality and nutritious Cookies (carbohydrate content 61 %, protein content 13.4 %, fat content 22.2%).

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