

Effect of incorporation of flaxseed flour on the nutritional and sensorial quality of biscuit

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Biscuit were prepared at different concentration flaxseed flour 0 per cent (control), 5 per cent, 10 per cent and 15 per cent. Effects of incorporation of flaxseed flour on physicochemical and sensory characteristic of the biscuit were evaluated. In the present research among the entire formulation sample T₂(10%) flaxseed flour had good colour, appearance and texture. It almost contained moisture (2.68%), ash (2.1%), fat (22.88%), protein (12.18%), crude fibre (0.52%) and this sample scored well in sensory evaluation.

Key Words : Flaxseed flour, Wheat flour, Sugar, Biscuit, Sensory parameters

How to cite this article : Patil, S.S., Sheety, V.S., Todkar, A.P. and Bodhankar, H.B. (2013). Effect of incorporation of flaxseed flour on the nutritional and sensorial quality of biscuit. *Food Sci. Res. J.*, 4(1): 20-23.

INTRODUCTION

Flaxseed also named as Linseed, is an economically important oilseed crop. The botanical name of flaxseed is (*Linum usitatissimum*). It is cultivated for fibre and oil. 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)

Researcher have found that 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. Flaxseeds may lower cholesterol levels, especially in women. Initial studies suggest that flaxseeds taken in the diet may benefit

individuals with certain types of breast and prostate cancers. Benefits of flaxseed as shown in many studies include lowering total Cholesterol and LDL cholesterol (Bad Cholesterol) levels. Other benefits show that flaxseed may help to lower blood triglyceride and blood pressure. It may also keep platelets from becoming sticky, therefore, reducing the risk of heart attack. India ranks third in the production of flaxseed. Canada is the largest producer of flaxseed and then China is second producer.

Nutritive value of flaxseed:

Nutritional value of flaxseed is given in Table A.

Table A. All values as per 100 g of edible portion	
Flaxseed/Linseed	Content
Moisture (g)	6.3
Protein (g)	20.3
Fat (g)	37.1
Minerals (g)	2.4
Crude fiber (g)	4.8
Carbohydrate (g)	28.9
Energy (kcal)	530
Calcium (mg)	170
Phosphorus (g)	370
Iron (g)	2.7

Tressler, D.K., Sultan, W.J. (1975)

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The middle French word *biscuit* is derived from the Latin words *bis* (twice) and *coquere* (to cook) and hence, means “twice-cooked.” Americans usually call a cracker or cookies. The principle basis for most baked products that can be regarded as a snack food is wheat flour. Flaxseeds contain high levels of dietary fibre an abundance of micronutrients and omega-3 fatty acids. Flaxseed production 167,000 metric tons in India. Flaxseed is utilized for preparation of nutritional biscuit. The present investigation was carried out for the standardization of technique for preparation of flaxseed biscuits.

Nutritional composition of biscuit:

Nutrition composition of biscuits is given in Table B.

Table B. Nutritional compositions of biscuits per 100 g	
Parameters (%)	Values
Moisture	1.3
Total ash	1.0
Protein	6.0
Fat	20
Carbohydrate	70
Fibre	1.7

Ridhi Siddhi and Shashi Jain (2003)

METHODOLOGY

Collection of raw material:

Flour, shortening, flaxseed flour, baking powder, milk powder, salt and sugar were purchased from local market of Chiplun.

Preparation of flaxseed flour:

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

Preparation of biscuit:

Sieve the refined wheat flour and different concentration of Flaxseed flour, mix them. Powdered sugar added into fat, this process is known as creaming. Then slowly add mixed

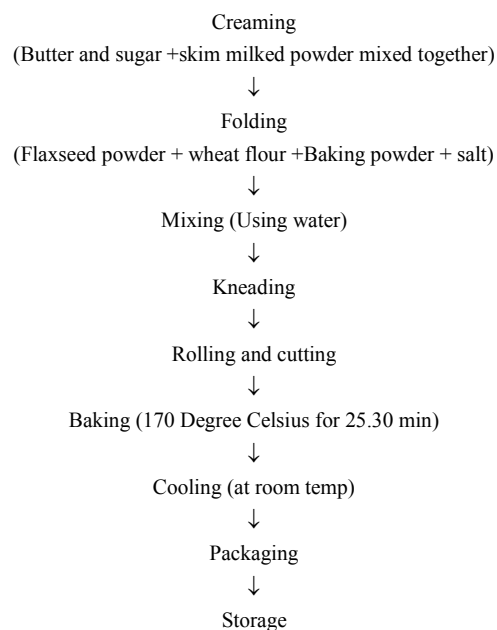


Fig. 1. Flow diagram for preparation of flaxseed biscuit

flour with baking powder. Mix milk powder into little quantity of water and then add dough was produced by proper kneading with hands. When dough was ready it was kept for 10-15 min. and then used for sheeting. Rolling ball of dough on wooden plat form made sheets. These sheets were cut by hand operated metal dye keep for baking. Then cool these biscuits at room temp and then packaging.

Physicochemical analysis:

Diameter and thickness measured in mm by using scale. Spread ratio was calculated by

$$\text{Spread ratio} = \frac{\text{Diameter}}{\text{Thickness}}$$

Moisture was determined as per method of A.O.A.C. (1975). Total protein was determined by micro K jeldhal 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)

Table C. Formulation for preparation of biscuit				
Ingredients (g)	Standard biscuit (Control)	Biscuit (A) T ₁	Biscuit (B) T ₂	Biscuit (C) T ₃
Refine wheat flour (g)	100	95	90	85
Fat (g)	40	40	40	40
Sugar (g)	50	50	50	50
Baking powder (g)	01	01	01	01
Flaxseed flour (g)	--	5	10	15
Salt (g)	02	02	02	02
Milk powder (g)	10	10	10	10

method. For Ash estimation biscuit samples were kept in muffle furnace at 550°C for 6 hr.

Sensory evaluation of biscuit:

Sensory evaluation was carried out for colour, flavour, texture, appearance, taste and overall acceptability of biscuit using 9 point hedonic scales.

OBSERVATIONS AND ASSESSMENT

The results obtained in the investigation, the physical characteristics of biscuits prepared replacing wheat flour with 5 to 15 per cent flaxseed flours are presented in Table 1. The thickness of flaxseed biscuits was greater than that of the control biscuit. The diameter of the biscuit decreased gradually with increasing proportion of flaxseed flour. The spread ratio of biscuits also decreased significantly with increasing level of flaxseed flour.

Proximate composition of biscuit is presented in Table 2. Moisture content of flaxseed biscuit was higher than those of control biscuit. This was due to the more addition of 10 per cent flaxseed flour which increased both protein and fat content of biscuits. The fat content of T₃ was more than the control and other experimental biscuits. The ash and crude fibre contents of flaxseed biscuits were more than control biscuit and this attributed to higher ash and crude fibre content of flaxseed flour. Flaxseed biscuit contains much higher amount of calcium,

phosphorus and iron than control biscuit.

Sensory evaluation of flaxseed biscuits is depicted in Table 3. Total score of flaxseed biscuits containing 10 per cent flaxseed flour (T₂) was high (45.2) as compared to control and other treatments. The acceptability of biscuit, the texture of flaxseed biscuit was significantly affected by increased level of flaxseed flour. However, the texture of biscuit containing 10 per cent flaxseed flour was comparable with that of control.

With the increase in level of flaxseed flour the sensory scores for texture and flavour of biscuits decreased except T₂. However, there was no mark reduction in the score for colour, taste and the appearance of biscuit. The biscuit containing 10 per cent flaxseed flour have maximum overall acceptability where as biscuit containing 15 per cent flaxseed flour was unacceptable to the panellist. The biscuit containing 10 per cent flaxseed is having higher acceptability. The acceptability is reduced due to greater hardness and poor flavour contributed by flaxseed flour at high level.

Conclusion:

Bakery products such as biscuit, bread, cake and cookies are gaining popularity as processed food because of their availability ready to eat, convenience and better shelf life. From this study it can be concluded that, incorporation of flaxseed flour up to 10 per cent and improves the nutritional quality with respect to protein and fat content. Biscuits with 10 per

Table 1: Physical analysis of biscuit

Sample	Weight (g)	Diameter (mm)	Thickness (mm)	Spread ratio
Control	10	63	5.5	11.45
T ₁	9.7	62.5	6	10.41
T ₂	9.8	61	6.8	8.97
T ₃	9.5	59	7.2	8.19

Table 2. Chemical analysis of biscuit

Sample	Moisture (%)	Ash (%)	Fat (%)	Protein (%)	Crude fibre (%)
Control	2.2	0.65	18	5	0.12
T ₁	3.65	1.98	21.82	10.27	0.62
T ₂	2.68	2.1	22.88	12.18	0.52
T ₃	2.85	2.42	25.60	14.03	0.70

Table 3. Sensory evaluation of biscuits

Sr. No.	Parameters	Control	T ₁	T ₂	T ₃
1.	Colour	7.8	7.2	7.3	7.1
2.	Flavour	7.6	7.4	7.6	6.9
3.	Texture	7.4	7	7.4	7
4.	Appearance	7.4	7.5	7.6	6.9
5.	Taste	7.6	7.4	7.5	6.8
6.	Over all acceptability	7.4	7.4	7.5	6.9
7.	Total score	44.6	44.5	45.2	41.6

cent flaxseed flour having highest overall acceptability, which contain 12.18 per cent protein. The increase in percentage value decreases the overall acceptability of biscuits. When compared with standard biscuits without affecting sensory quality adversely and these experimental biscuits can be safely stores at room temperature.

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Received : 21.08.2012; Revised: 12.01.2013; Accepted : 13.02.2013