International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

# Nutritive Evaluation of Wheat Bran Biscuits Incorporated with Flaxseed

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**Abstract:** ***Demand for health oriented products such as sugar-free, low calorie and high fiber products are increasing. One such recent trend is to increase the fiber content in food products to overcome health problems such as hypertension, diabetes, colon cancer, high bad cholesterol levels and many more [1]. This work is aimed at determining the maximum acceptable level of flaxseed flour and wheat bran flour that is used for preparing biscuits having high nutritive content. Flaxseed is being used extensively for the development of functional foods [2]. It is an important oilseed crop which has gained importance since last few decades due to its unique nutrient profile. It comprises high amount of fiber and is a significant source of α-linolenic acid in the diet of vegetarian people. It is evident from several studies conducted that flaxseed carries functional ingredients and provide health benefits. Omega-3 fatty acid, lignan and dietary fiber are major bioactive components of flaxseed which can be delivered through value added products. Flaxseed has been successfully exploited in preparation of various value added products. Commercially, all parts of flaxseed plant are exploited directly or after processing. Flaxseed consumption in the diet prevents serious diseases like coronary diseases, cancer, diabetes, obesity, gastrointestinal, renal and bone disorders. To the best of our knowledge, very limited review reports are available for commercial utilization of flaxseed in preparation of various value added products (bakery, dairy, extruded, snack, fermented and other traditional) and effect of flaxseed fortification on nutritional, physiochemical, phytochemical and sensory properties of these products [3]. Also, cardiovascular diseases are one of the major health problems all over the world. Various functional foods are being incorporated for health promotion and disease prevention. Flaxseed due to its alpha-linolenic acid content has a significant cardio-protective efficacy [4]. Biscuits contain high amount of fat and sugar, thus having high calorie but low nutrient density. Wheat bran is a good source of dietary fiber and protein and is thus a good candidate for nutritional enrichment of cereal foods [5]. Wheat bran is a low-cost by-product abundantly produced by the wheat flour industry [6]. It has relatively various applications in food industries due to its richness in polysaccharides carbohydrates, dietary fiber, protein which makes it a vital dietary element [7]. The aim of this study was acceptability of biscuit containing three different combinations of powders of wheat bran, flaxseed and wheat viz., 25:75:0, 0:50:50, 20:80:0 were used to prepare 100gms flour mix. The wheat bran biscuit which was most acceptable i.e., biscuit incorporated with 75% flaxseed flour was sent to the Regional Food Research & Analysis Centre for nutritional analysis. A biscuit weighing 40gms was nutritionally evaluated. The test results revealed that the biscuit contained 28.50% Fat, 10.72% Protein, 54.98% Carbohydrate, 519 K Cal/100g Energy and 2.03% total Ash.***

**Keywords:** flaxseed, health benefits, functional food, biscuit, wheat bran, nutritive analysis

## 1. Introduction

Balanced diet is vital for good health and well-being. The food delivers energy, protein, fat, vitamins and minerals for living, growth and to work properly. Wide variety of different foods is required to provide precise amounts of nutrients for good health. Unhealthy eating habits are the leading cause of death and increased risk of numerous diseases. Diet and nutrition play an important role in critical ailments such as coronary heart diseases, obesity, cancer, type-2 diabetes, bone disorders, dental caries, gall bladder disease, dementia and nutritional anemia.

The baking industry is one of the leading systematized processed food industry. Bakery products are popular due to their convenience, low price and ready-to-eat nature, easy transportation, availability in numerous tastes and textural profiles. The foremost benefit of bakery products is docility for fortification with cereals, millets or other ingredients. Therefore, these products are an effective medium for delivering functional ingredients to consumers. Commercially available cookies are mostly deficient in alpha-linolenic acid and dietary fiber. Refined ingredient usage makes biscuits deprive of grain components that are protective of health. Flaxseed can be incorporated into baked good as whole, milled, ground, roasted and in the form of oil. Flaxseed addition in bakery products has been a challenge for various researches due to oxidative instability of flaxseed at high temperatures and during storage. Recent studies have suggested that flaxseed has been used in various bakery products like bagels, breads, biscuits, cookies, muffins, pizza, buns and patties at different levels. Flaxseed (Linum usitatissimum) commonly known as linseed is a member of the genus Linum in the family Linaceae. It is an oldest agronomic crop having more than 300 species and which are cultivated for food and fiber since ancient times. Flaxseed is recognized either by variety or by color. Brown colored flaxseed is the most common and high in alpha-linolenic acid, while there are two types of yellow colored flaxseed: Omega and Linola. Demand for flaxseed has been increased because of consumer awareness about the relationship between diet and health. Functional ingredients present in flaxseed make it beneficial for critical diseases like cardiovascular diseases, cancer, diabetes, obesity, renal and bone disorders. Dietary flaxseed modifies cardiovascular risk factor by improving lipid profile in hyperlipidemic patients. Omega-3 fatty acids possess anti-inflammatory properties so they protect the destruction of kidneys in adults. More consumption of omega-3 polyunsaturated fatty acid reduced occurrence of chronic kidney diseases. Flaxseed flour greatly enhanced nutritional qualities without affecting the overall acceptability of products. Ash, protein, fat and crude fiber contents of flaxseed biscuits were more than control which could be

accounted by the fact that flaxseed is far higher in mineral, fat, protein and fiber content than wheat flour [3].

Being a readily available and inexpensive source of dietary fiber, wheat bran is widely used in biscuits. It is a potential source of protein and dietary fiber. It is a by-product of flour milling industry used mainly for animal feed. In recent years, however, the use of wheat and other cereal bran has gained importance in the formulation of various food products. Wheat bran is high in protein, magnesium, manganese, niacin, phosphorus, zinc and vitamin B6, and is low in fat, with no cholesterol, and no sugar or sodium. It can help maintain normal bowel function and relieve occasional constipation, such as caused by changes in dietary habits or travel. There have been several attempts to incorporate wheat bran from various sources into cereal products as a high protein and high fiber source [1]. Several researchers have successfully used wheat bran to enhance the nutritional quality of baked products such as cookies, cakes, yeast breads, biscuits and muffins [8].

The growing consumer demand for food with nutritional and sensory quality as well as functional claim has called for research to develop new products, which include not only the nutritional and functional characterization, but also consider consumer acceptance. Bakery products such as biscuit have high consumer acceptance and are important for delivering bioactive compounds into the human diet. The objective of this study was to prepare biscuit with different proportions of flaxseed, wheat bran and wheat flours, to characterize their nutritional value, and to evaluate the biscuit acceptance by penal member [2].

## 2. Materials and Methods

**Procurement of Raw Material**
Wheat bran, wheat flour and flaxseed were used in the study. Other ingredients used in the preparation of biscuits included almond, baking powder, sugar, unsalted butter, salt and ginger which were all purchased from the local market of the Lucknow area.

**Processing of Raw Material**
All raw ingredients were cleaned to remove the sand, dirt and unwanted particles. After that, all ingredients were washed in water and dried to desirable level of moisture control. Flours were obtained by grinding them in flour mill. Other materials like baking powder, almond, butter, salt and ginger were purchased from market.

**Preparation of Different Flour Mix for Biscuits**
For the purpose of standardization of flour mix, a number of preliminary trials were conducted. Different combinations of powders of wheat bran, flaxseed and wheat viz., 25:75:0, 0:50:50, 20:80:0 percent was used to prepare 100g flour mix for biscuits.

**Biscuits Preparation**
The biscuits were prepared after the flour preparation, following a standard formulation, with the addition of three different levels of flaxseed flour. Table 1 shows the ingredients and their amounts used in the biscuits preparation. Dry ingredients (like wheat bran flour, flaxseed flour, wheat flour, baking powder) were mixed and sieved twice for uniform mixing of leavening agents to the flour. Weighed amount of salt was added in the flour mixture. Weighed amount of unsalted butter was taken in a bowl and stirred until it melts. Sugar was added and stirred continuously for creaming. Flour mix was added in smaller amounts into the cream and uniformly mixed. Soft dough was prepared by sprinkling small quantity of water. Dough was rolled and then biscuits were cut into small round shape using biscuit cutter. Biscuits were kept in an electric oven for 20 to 30 minutes at 125˚C for uniform baking.

**Table 1:** Standardized recipe of Biscuit

| Ingredients | Control T1 | Sample T2 | Sample T3 |
|---|---|---|---|
| Wheat bran flour | 25 g | - | 20 g |
| Flaxseed flour | 75 g | 50 g | 80 g |
| Wheat flour | - | 50 g | - |
| Ginger | - | - | 3 g |
| Almond | 5 g | 5 g | 5 g |
| Sugar | 14 g | 14 g | 14 g |
| Unsalted butter | 330 g | 330 g | 330 g |
| Baking powder | 3 g | 3 g | 3 g |
| Salt | 1 g | 1 g | 1 g |

**Nutritive Analysis**
Nutritive analysis of fresh produced biscuit samples was carried out by the Regional Food Research & Analysis Centre. The samples were evaluated for desirability in nutrients. A biscuit weighing 40gms was nutritionally analyzed. It was found that the 75% flaxseed flour incorporated wheat bran biscuit contained the following nutritional content: 28.50% Fat, 10.72% Protein, 54.98% Carbohydrate, 519 K Cal/100g Energy and 2.03% total Ash.

## 3. Results and Discussion

To develop the flour mix, wheat bran, flaxseed and wheat four were procured and processed separately. All the three flours were then mixed in the ratios 25:75:0, 0:50:50 and 20:80:0 percent respectively, which were used to prepare 100g flour mix for biscuits. After the sensory evaluation of the biscuits, it was found that the biscuits prepared from 25% wheat bran flour and 75% flaxseed flour mixture were the most acceptable. These samples were then sent to the Regional Food Research & Analysis Centre for their nutritional evaluation. A biscuit weighing 40gms was nutritionally evaluated. The test results revealed that the biscuit contained 28.50% Fat, 10.72% Protein, 54.98% Carbohydrate, 519 K Cal/100g Energy and 2.03% total Ash.

**Table 2:** Test Results

| S. No. | Parameters | Results | Test Method |
|---|---|---|---|
| 1. | Fat, % | 28.50 | IS: 12711: 1989, RA2005 |
| 2. | Protein,% | 10.72 | IS: 7219: 1973 RA2005 |
| 3. | Carbohydrate, % | 54.98 | SP: 18-(P-6) 1981 |
| 4. | Energy, K Cal/100g | 519 | - |
| 5. | Total Ash, % | 2.03 | FSSAI MANUAL |

## 4. Conclusion

Flaxseed and wheat bran should be included in daily diet plan. The formulations made with up to 75% flaxseed flour and 25% wheat bran flour as partial replacement of wheat

flour proved to be much nutritious as compared to the wheat flour biscuits. Omega-3 fatty acid, lignan and dietary fiber are major bioactive components of flaxseed. Flax seed increased the protein, ash, fat, fiber and energy content in the biscuits, whereas, addition of wheat bran flour increased the content of dietary fiber, protein, magnesium, manganese, niacin, phosphorus, zinc and vitamin B6, and is low in fat, with no cholesterol, and no sugar or sodium. Flaxseed helps to overcome health problems such as hypertension, diabetes, colon cancer, high bad cholesterol levels and many more. Flaxseed consumption prevents serious diseases like coronary diseases, cancer, diabetes, obesity, gastrointestinal, renal and bone disorders. Its alpha-linolenic acid content has a significant cardio-protective efficacy. Omega-3 fatty acids in flaxseeds possess anti-inflammatory properties so they protect the destruction of kidneys in adults.

Wheat bran can help maintain normal bowel function and relieve occasional constipation, such as caused by changes in dietary habits or travel.

Therefore, it is recommended to utilize these valuable by-products in production of biscuits to gain more nutritional properties of this product.

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