

Formulation and Standardization of Barley Flour Incorporated with Chia Seeds Crackers

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Abstract – Barley (*Hordeum vulgare*) is an edible grain and cereal plant of the Poaceae grass family which is grown in various environments. Barley has a nut-like flavour, which is rich in carbohydrates, has moderate amounts of protein, calcium, and phosphorus, and low amounts of B vitamins. Barley is particularly rich in Beta-Glucan, which is a type of soluble fiber. It is a staple food grain in North Africa and parts of Asia. Chia seeds (*Salvia hispanica* L.) are small seeds from an annual herbaceous plant, which contains healthy Omega-3 fatty acids, polyunsaturated fatty acids, dietary fiber, protein, vitamins, and some minerals. The health benefits of chia seeds can help to lose weight and control blood sugar and cholesterol. The aim of this study is to standardize the addition of various barley flours food products incorporated with chia seeds crackers. There are 3 variants of the various ingredients added in the preparation of this product. It is estimated by a panel of judges using a score sheet with a five-point hedonic scale. Sensory attributes such as colour, taste, texture. The Shelf-Life of the product is examined to ensure that the product is in good condition during storage period. Moisture, crude protein, fat, crude fiber, total ash, insoluble ash, carbohydrates, energy content and other nutrients in barley flour incorporated chia seeds crackers were evaluated. The packaging used to pack barley flour incorporated chia seeds crackers is a cardboard box. An average of 10 points was obtained for these crackers during evaluation. For this reason, these crackers are highly acceptable and recommended for all age groups.

Key words – Barley flour, Chia seeds, Health benefits, Packaging material, Shelf-Life.

1. INTRODUCTION

Barley a member of the grass family, is a major cereal grain growth in temperate climates globally. It was one of the first cultivated grains, particularly in Eurasia as early as 10,000 years ago. Globally 70% of barley production is used as animal fodder, while 30

% as a source of fermentable material for beer and certain distilled beverages, and as a component of various foods. It is used in soups, stews, and in barley bread of various cultures. Barley grains are commonly made into malt in a traditional and ancient method of preparation. Barley is mainly grown in Uttar Pradesh, Rajasthan, Punjab, Madhya Pradesh, Haryana, Bihar, Himachal Pradesh, West Bengal, and Jammu Kashmir. Barley has been a staple grain in many cultures. Ancient Greek, Roman, Egyptian, Chinese and Viking civilizations all used barley. Barley has many health benefits because of its nutritional properties. It is rich in minerals, vitamins, and other nutrients. In addition, it contains protein, fat, and fibre. It also has a significant amount of iron, calcium, magnesium, phosphorus, and niacin. Barley is an excellent source of dietary fiber, but also contains other essential minerals, including magnesium, manganese, and selenium. Compared to whole grain oats, barley has more dietary fiber and is lower in fat and calories. One of these fibers is called beta glucan, which is a soluble fiber that has been reduce cholesterol level. The health benefits of barley are high source of fiber that can help improve digestion, helps with weight loss, helps control blood sugar levels, helps lower high cholesterol, prevents heart disease, provides antioxidants, high in vitamins and minerals, helps protect against cancer.



Figure 1 Barley

Chia seeds are edible seeds of flowering plants from the mint family (Lamiaceae), which originates from central and southern Mexico. It is related to the genus *Salvia Columbariae* in the western United States and Mexico. Chia seeds are oval, grey with black and white spots and about 2 mm (0.08 inch) in diameter. The seeds are hygroscopic, so they can absorb up to 12 times their weight in liquid. Chia seeds contain 25% extractable oil and are rich in Omega-3 fatty acids. Fatty acids are unsaturated and essential oils include linolenic acid. Chia seeds also contain 6% water, 16% protein and 42% carbohydrates. Other minerals contained in chia seeds are iron, calcium, magnesium, zinc, phosphorus, and manganese. It gives chia-based foods and drinks a special texture by creating a slime layer that gives chia seeds a gelatinous texture when soaked.



Figure 2 Chia Seeds

Chia seeds are delicious and easy to digest, especially when prepared properly. Consuming chia seeds promotes health, improves heart function, and provides energy. Omega-3 fatty acids lower blood pressure and cholesterol levels. The fiber and protein in chia seeds are helpful for people to lose weight. Typically, a 28 gram (1 ounce) serving of chia seeds contains about 10 grams of fiber. Also, the protein in chia seeds can help reduce appetite and food intake. A study of 24 participants found that eating 7 grams (0.33 ounces) or 14 grams (0.5 ounces) of chia seeds with yogurt for breakfast increased feelings of fullness compared to yogurt without chia seeds. Just adding chia seeds to our diet does not seem to cause weight loss by itself, but if you are trying to lose weight, they can be a great addition to a healthy diet.

2. OBJECTIVES

- To formulate the Barley flour crackers incorporated with chia seeds, oats flour and beetroot juice.

- To standardize the Barley flour, oats flour, chia seeds and beetroot juice crackers.
- To evaluate acceptability of barley flour crackers by sensory evaluation.
- To estimate the nutrient content of the developed barley flour crackers by standard method.

3. MATERIALS AND METHODS

A. PROCUREMENT OF RAW MATERIALS

The raw materials such as Barley flour, Oats flour, Chia seeds, Beetroot juice, Olive oil, baking powder, Salt a pinch, Powdered sugar bought in local market.

B. CHEMICALS

The chemical and reagents used for the study were laboratory reagent (LR), Analytical reagent (AR) or Guarantee reagent (GR) Grades.

C. UTENSILS

Stainless steel, Vessels, Bowl, spoon, plate, Tray, knife ladle and glass tumbler were used for preparing and serving the developed products.

D. ENERGY

Electric current and liquid petroleum gas were used as heating sources.

E. EQUIPMENTS USED

Weighing balance, electronic balance, Mixer, Hot air oven, Muffle furnace.

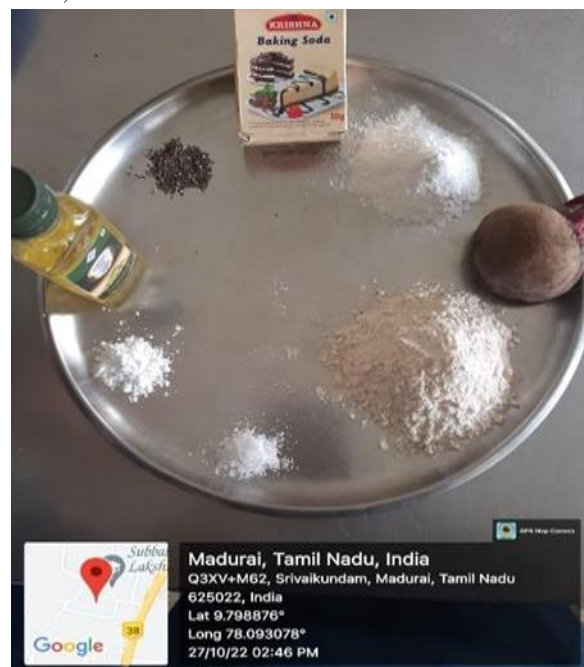


Plate 1 Ingredients used in the development of Barley flour incorporated with chia seeds crackers

4. FORMULATION OF BARLEY FLOUR INCORPORATED WITH CHIA SEEDS CRACKERS

Barley flour and chia seed have high nutritive value and enormous health benefits. Chia seeds was incorporated in different products such as smoothies and juices mixed into yogurt and oatmeal, or sprinkled on top of a salad. Beetroot juice was incorporated at the level of 5%,10%,15% in the formulated barley flour products respectively.

5. METHODOLOGY

Weigh the amount of all ingredients. Mix the dry ingredients in the mixing bowl. Add oil and beetroot juice gradually and mix it well and make it into a soft dough. And transfer a soft dough in a bowl and close it for resting period. After that take a rolling board and rolling bin. Take a dough in a small amount and roll it into a round shape. Dust the rolling board with flour and place the dough and start rolling the dough until it became thin. Cut the dough into square shapes. And take fork and put small holes in it. And take it gently and transfer the dough into tray. Before that preheat the oven for 5 minutes. Take the tray and spread flour and arrange all the square shapes dough in the tray. And set the tray in oven at 350-degree Fahrenheit for 10 minutes after that the crackers is ready to serve. Control 5%,10%,15% of Beetroot juice incorporated with barley flour were developed and evaluated for its acceptability, the flow chart for the development of control and chia seed incorporated barley flour crackers.



Plate 2 Control and Barley flour incorporated with chia seeds crackers

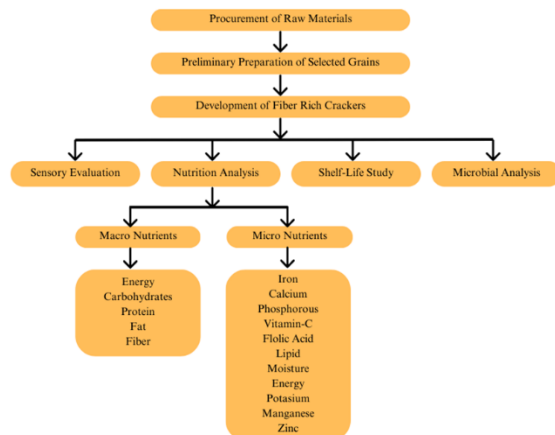


Figure 3 Formulation of barley flour incorporated with chia seeds crackers

6. PREPARATION OF BARLEY FLOUR INCORPORATED WITH CHIA SEEDS CRACKERS

- Step-1: Take all the ingredients.
 - Step-2: Measure all the ingredients correctly.
 - Step-3: Mix all the ingredients.
 - Step-4: Make it into a dough.
 - Step-5: Roll the dough using rolling pin and spread it thin.
 - Step-6: Cut the dough into small square pieces.
 - Step-7: Wait for 10 mins for soft texture of the dough
 - Step-8: Pre-Heat the oven for 5 mins before baking.
 - Step-9: Take tray and spread flour gradually.
 - Step-10: Bake it for 10 mins in 350° F.
- Then we get Barley flour incorporated with Chia seeds Crackers.

7. SENSORY EVALUATION OF BARLEY FLOUR INCORPORATED WITH CHIA SEEDS CRACKERS

Sensory evaluation, also referred to as organoleptic evaluation, is a scientific method that provides objective information on how products are experienced by the consumer. When the quality of a food product is assessed by means of human sensory organs, the evaluation is said to be sensory or subjected or organoleptic evaluation. Sensory quality is a combination of different senses of perception coming and eating a food. Appearance, flavour, and mouth feel decides the acceptance of the food.

Organoleptic evaluation of food products is essential in ensuring products comply with organizational and customer requirements. Sensory assessment interpreting human reactions to food characteristics.



Figure 4 Sensory Evaluation

Barley flour crackers were prepared by incorporating beetroot juice at the level of 5%, 10%, 15% respectively. It was evaluated by a panel of judges using score card with five-point hedonic scale rating.

8. COST ANALYSIS

The cost of Barley flour incorporated with chia seeds crackers were analysed by considering the fixed and variable cost include during processing and production. Cost benefits analysis of the product were done and it is given below.

S. No	Ingredients	Cost (₹)	Quantity
1	Barley flour	7.2	40g
2	Oats flour	7	20g
3	Chia seeds	2.7	5g
4	Beetroot juice	5.2	15g
5	Baking soda	0.13	A pinch
6	Olive oil	7.4	10 ml
7	Salt	0.008	A pinch
8	Sugar	0.55	10 g
9	Electricity	10	-
10	Packaging	10	-

Table 1 Cost Analysis of Barley flour incorporated with chia seeds crackers

Total Cost = ₹ 70.188
Profit = ₹ 5

Total amount = ₹ 75

9. NUTRIENT ANALYSIS OF BARLEY FLOUR INCORPORATED WITH CHIA SEEDS CRACKERS

Nutritional analysis refers to the process of determining the content of food products and foods. The procedure can be done in various ways

S. No	Nutrients	Percentage
1.	Moisture	9.68%
2.	Crude protein	7.42%
3.	Fat	7.7%
4.	Crude Fiber	7.7%
5.	Total Ash	2.3%
6.	Insoluble Ash	0.12%
7.	Carbohydrate	72.9
8.	Energy	390.5Kcal

Table 2 Nutrient Analysis of Barley flour incorporated with chia seeds crackers

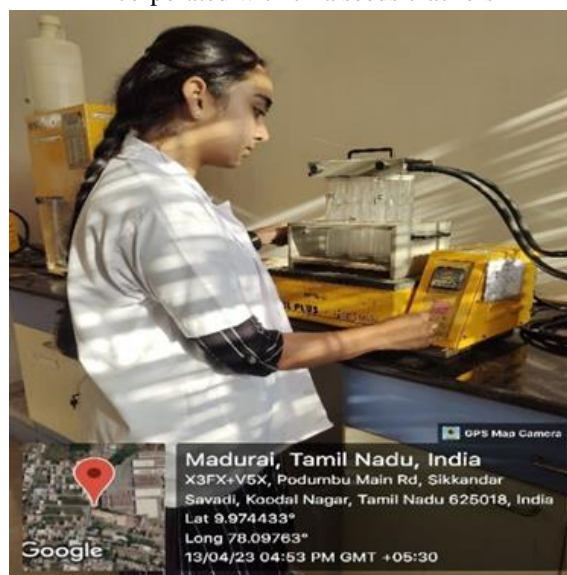


Figure 5 Nutrient Analysis

10. RECOMMENDATION

- ✓ Supplementation studies can be carried out by using Barley flour incorporated with Chia seeds Crackers
- ✓ Shelf life of the standard products can be assessed
- ✓ Storage studies can be carried out by using different packaging materials

11. RESULT AND DISCUSSION

The data collected from the present investigation entitled “Barley flour incorporated with Chia seeds Crackers” was consolidated graphically represented under the following methods.

1. Acceptability of the developed Barley flour incorporated with Chia seeds Crackers and its variation
2. Nutrient analysis of standardized of Barley flour incorporated with Chia seeds Crackers
3. Shelf-life analysis of standardized Barley flour incorporated with Chia seeds Crackers
4. Cost analysis of standardized Barley flour incorporated with Chia seeds Crackers

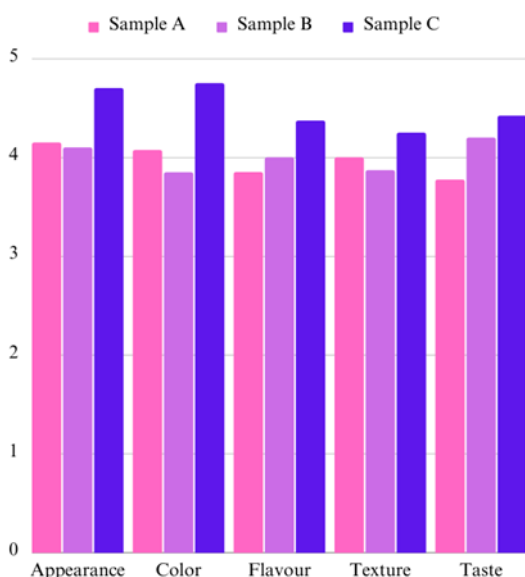


Figure 6: Acceptability of Developed Crackers

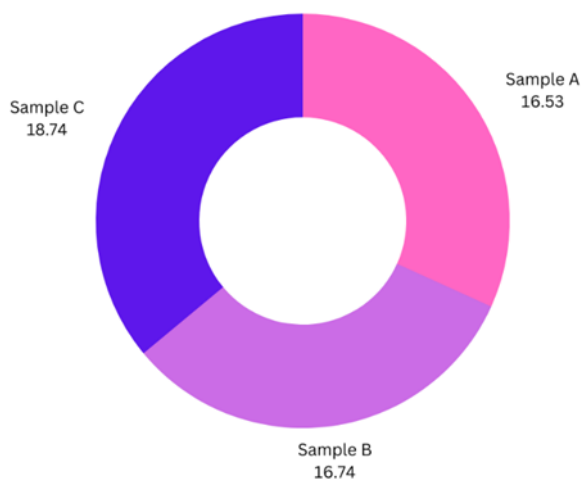


Figure 7: Overall Mean Score

From this pie chart, it has been clearly shows that the Sample C is highly acceptable for consumption. Among the developed product, the overall mean score in Barley Flour Incorporated with Chia Seeds Crackers was highly acceptable.

12. SUMMARY AND CONCLUSION

A summary of the result of the study carried out to analyse the “Formulation and Standardization of Barley flour incorporated with chia seeds crackers” are dealt in this chapter. The data in sensory evaluation and nutrient analysis of the standardized products have been summarized and concluded.

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