



Formulation Of A Nutritious Cake By Using Chia Seed Flour Along With Oat Milk And Coconut Sugar

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Article History	Abstract
Received: 30/09/2023 Revised: 15/10/2023 Accepted: 30/10/2023	Cake is a soft and fluffy food product that is a very tasty and delicious food for not only children but also for all age groups. Generally, the cake contains a high amount of sugar and carbohydrates. To make a healthy and nutritious cake for all, some ingredients can be modified to produce a newly developed cake. Chia seed flour can be used which is enriched with high fiber can improve cardiovascular health, promotes intestinal health, and reduces cholesterol levels. Another ingredient is coconut sugar a plant-based natural sweetener that can be used as a substitute for table sugar and is also a rich source of some minerals and would help to prevent blood sugar levels and to reduce depression and anxiety. In this study, cake prepared with chia seed flour, coconut sugar, and oats milk has good nutritive value and good sensory acceptance.
CC License CC-BY-NC-SA 4.0	Keywords: Chia seed flour; Oats milk; Coconut sugar; Cake

1. Introduction:

Appropriate nutrition is a key component in the prevention of many disorders linked to modern society. According to Wang et al. (2016), the top four killer diseases today are coronary heart disease (CHD), cancer, depression, and diabetes. Nevertheless, supplying enough, secure, and wholesome food to people will continue to be a major concern today and into the future.

A nutrient-dense and medicinal food, Chia seeds have become one of the most recognized foods in recent years (Knez et al., 2019). Chia contains the highest amount of linolenic acid and can be easily added to commercial food, according to Knez et al. (2019). Several studies have shown that chia seeds may be beneficial for health, antioxidants, and antimicrobial activity due to the high fatty acid content (Knez et al., 2019).

According to studies, oats have positive impacts on health when it comes to digestive issues (Stark and Madar, 1994); they also have anti-cancerous properties (Gallaher, 2000). Several health benefits associated with oat grains, such as glucan, functional proteins, fat and carbohydrate components, as well as phytochemicals, have led to an increase in consumption of oats. As well as phenolic compounds, oats contain anthranilic acids, avenanthramides (AVAs) (Dimberg et al., 1993), which exhibit antioxidant properties. Researchers worldwide have paid close attention to the nutritional benefits of oats, which has led the food industry to increasingly use

oats as food ingredients (Del Valle et al., 1981; Zhang et al., 1998; Onning et al. 1999; Gupta et al., 2010; Ryan et al., 2011; Ballabio et al., 2011).

Coconut sugar is a common sweetener in south and south-eastern Asian cuisine (Levang, 1988). The primary reason for this preference is that natural compounds are considered healthier than synthetics. The public's increased interest in healthy diets and the negative perception of excessive sugar use (Wrage et al., 2019) has motivated consumers to switch from refined sugar to alternative sweeteners like coconut sugar.

Customers are becoming more knowledgeable about natural substances today. The food sector has been significantly impacted by consumers' increasing focus on naturalness (Roman et al., 2020; Saraiva et al., 2020). Most consumers in most countries frequently reject food goods they don't believe to be natural. In recent years, the demand for sweeteners derived from natural sources has soared (Philippe et al., 2014).

The aim of this study is to formulate a nutritious cake with chia seeds, oat milk, and coconut sugar and disclose the acceptability of the newly developed chia seed cake.

2. Materials and methods

2.1 Material

- 60 g Chia Seed Flour
- 100 ml Oat Milk
- 50 g Coconut Sugar
- 5 ml Vanilla Extract
- 50 ml Vegetable Oil
- 2 g Baking Powder
- 0.5 g Baking Soda

2.2 Methods

2.2.1 Cake Preparation.

The Chia seed was cleaned and ground by a mixer. Then oats were dissolved in the water overnight. After that blend the water and oats in a blender and strain by a strainer to collect the oat milk. In a bowl, chia seed flour, oats milk, coconut sugar, and vegetable oil were mixed thoroughly. For three to five minutes, beat the mixture on medium-high with a hand mixer until it lightens in color and slightly thickens. Baking powder, baking soda, and vanilla extract were mixed in it and repeatedly beaten. The batter was taken in a cake pan. Bake the cake pans for approximately 15 minutes in a microwave oven (180 °C). After the cake has finished baking, insert a toothpick into the center and it should come out clean.

2.2.2 Proximate Analysis of Cake

2.2.2.1 Moisture Content: The standard method (AACC, 2000) was used to determine the moisture percentage of the cake. 5 gm of the sample was weighed accurately in weighing balance. The hot air oven was preheated at 100°C. The sample was kept in the pre-weighed Petri plates & entered into that preheated oven & kept for 30 minutes. After 30 minutes the sample was taken out and weighed. This method was continued until the weight of the sample became constant. The lost weight of the sample determined the amount of moisture present in the sample.

$$\frac{100 \times W' - W''}{W' - W''} = \text{Moisture \%}$$

W= Initial wt. of Petri plate

W'= Initial wt. of Petri plate + Initial wt. of sample

W''= Initial wt. of Petri plate + sample

2.2.2.2 Ash Content: To determine the cake's ash content, the standard AACC, 2000 method was used. In this procedure, 5 g of material was weighed in a tared porcelain crucible and burned at 550°C in a muffle furnace for 5 hours, leaving behind a greyish residue. The formula used to calculate ash was as follows:

$$\text{Amount of Ash (\%)} = \frac{\text{Weight of ash}}{\text{Wt. of sample}} \times 100$$

2.2.2.3 Crude protein: The crude protein content of the cake was estimated using the Lowry method (Lowry et al., 1951).

2.2.2.4 Crude lipids or fats: The conventional approach (AACC, 2000) was used to estimate crude fat. Petroleum ether was added to a Soxhlet apparatus containing 2 g of cake sample, and fat was extracted for 2 to 3 hours. The apparatus was separated and the solvent was evaporated. Then the flask was placed in desiccators for cooling. The difference between the initial weight of the flask & final weight of the flask gave the amount of fat present in the sample.

2.2.2.5 Carbohydrates content: A subtraction method was used to estimate the total amount of carbs as follows:

$$\text{Carbohydrate (\%)} = 100 - [\text{Moisture content (\%)} + \text{Protein content (\%)} + \text{Fat content (\%)} + \text{Ash content (\%)}]$$

2.2.3 Sensory Evaluation: 16 semi-trained panelists evaluated the taste of cake using a 9-point hedonic scale. 1 stands for "dislike extremely" on the hedonic scale of nine, whereas 9 represents "liked extremely." Based on the color, softness, flavor, mouthfeel, and general acceptability, each cake was given a preference score between 1 and 9. To prevent skewed results, all of the cake samples were offered to the panelists in random order (Chakraborty et al., 2020).

2.2.4 Physical properties

2.2.4.1 Penetration

According to Dev et al., 2021, the penetration of the cake was determined.

2.2.4.2 The pH measurement

According to Sengupta et al. 2019, pH was measured using a pH meter. A pH test was performed after mixing the cake with distilled water.

2.2.4.3 Color properties

Color intensities of the cake were determined using the colorimeter which gave the Hunter parameters (L^* , a^* , b^*) as well as c^* and h^* values directly (Morales & Boekel, 1998). After sample preparation, 10 grams of cake were placed in a Petri dish and the color was measured within a few minutes. L^* parameters indicated lightness (+ve) to darkness (-ve) which describes the light-reflecting capacity of the food sample. a^* and b^* parameters indicated redness (+ve) to greenness (-ve), and yellowness (+ve) to blueness (-ve) respectively.

3. Results and discussion

3.1 Proximate Analysis: **Table 1** shows the proximate composition of the formulated cake. Moisture is a sign of high-quality food and a highly desired sensory attribute in soft, fluffy pastry goods like cake and sweetbreads. The cake's moisture content was good for this cake. In a similar vein, chia seed cake also contains good carbohydrates, protein, ash, and fat. In the case of ash, the higher mineral content of the cake is good for health.

Similarly, Coelho and Salas-Mellado in their research reported that the chia seed-infused bread had higher levels of moisture, ash, fat, and proteins (Coelho and Salas-Mellado, 2015).

Table-1: Proximate Analysis

	Moisture (%)	Carbohydrate (%)	Protein (%)	Fat (%)	Ash (%)
Formulated Cake	10.5±0.8	48.2±1.00	14.5±0.5	21.2±1.00	5.2±0.5

3.2 Sensory evaluation

The overall acceptability of the cake is presented in **Table 2**. From **Table 2** it is observed that the cake has good scores for color, taste, odor, texture, sponginess, and overall acceptability. As a result, it can be considered a market-acceptable product from a sensory perspective.

Table-2: Sensory evaluation

Formulated Cake	Score
Color	7.00±0.08
Taste	6.8±0.1
Odor	6.5±0.08
Texture	7.55±0.08
Sponginess	7.20±0.19
Overall acceptability	7.00±0.1

3.3 Physical Properties

3.3.1 Penetration

Cake penetration is crucial for establishing consumer acceptance by checking the firmness of the cake. The penetration value of the cake is presented in **Table 3**.

3.3.2 Color properties

A key parameter for assessing the cake's quality was its color. Color properties of the cake were presented in **Table 3** which revealed the brightness (L*), redness (a*), and yellowness (b*) of the cake.

3.3.3 The pH

The pH value of the cake was 6.58 (**Table 3**). The pH values of chia seed butter, chia seed and sesame seed butter, and chia seed with watermelon seed butter and pumpkin seed butter were within the range of 5.0 to 5.6 in a study conducted by Ghosh et al. (2021).

Table-3: Physical properties

	Penetration 25 °C (1/10th mm)	Color			pH
		L	a*	b*	
Formulated Cake	140.2±0.8	65.6	11.28	24.45	6.58 ± 0.30

4. Conclusion:

Chia seed flour (CSF) was used to make a cake. The inclusion of CSF in the cake increased its nutritional value by increasing its overall protein, lipid, and mineral content. The cakes showed good sensory acceptance. So, this formulated cake may be a wise choice to boost the consumer's vigor and help prevent the development of several diseases.

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