



## STUDIES ON PREPARATION OF CHIA SEED FORTIFIED COOKIES

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Received: 16/02/2018

Edited: 24/02/2018

Accepted: 05/03/2018

**Abstract:** The experiment was carried out with the different levels of chia seeds and to check the increase in nutritional level of cookies. The cookies were prepared by adding chia seeds at the levels of 05%, 10%, 15%, 20% & 25% respectively. Chia cookies were evaluated for its various physicochemical, nutritional and organoleptic quality parameters, and study revealed that cookies prepared by adding chia seed at level 15% gave a better acceptable taste, texture and flavour. There was gradual increase in medicinal and organoleptic properties for level of 15% addition of chia seeds. Cookies fortified with chia seeds are rich in fiber, antioxidants and omega-3 fatty acids.

**Keywords:** Chia Seeds, Fibre Rich Cookies, Fortified Cookies, Omega-3 fatty acids.

### Introduction

Cookies and bread which are considered to be the major bakery product and they account for 82% of all bakery production. The highest performing member of the industry still is the biscuit sector, which is expected to over perform the growth of the entire industry. Among the different bakery products, cookies constitute the most popular group. Cookies are confectionery dried to very low moisture content. Biscuit is defined as a small thin crisp cake made from unleavened dough. Cookies are an important baked product in human diet and are usually eaten with tea and are also used as weaning food for infants. Cookies are ideal for their nutritive value, palatability, compactness and convenience. Having low moisture content than cakes and bread, cookies are generally safer from microbiological spoilage and have long shelf-life. In recent years, there is a much research on cookies ingredients and proportion which could be modified to make cookies nutritious and healthy. Cookies are fortified with various ingredients like soya flour or multi grain atta, fenugreek seeds, flex seeds, cow pea also various plants extracts like mint, moringa leaves can be added to increase their nutritional properties.

Chia is mostly identified as *Salvia Hispanica L.* or *Salvia Columbariae Benth.* Chia seeds are one of nature super food, the richest source of protein,

fiber, omega-3 fatty acids and packed with antioxidants. Another key feature of chia seeds is that it does not contain gluten. Chia can help cut cravings, balance blood sugar levels, improve cardiovascular diseases, all cancer types, allergies, lower cholesterol, triglycerides blood pressure and can promote weight loss. Chia seeds contain all the essential amino acids, partially lysine, leucine, isoleucine and valine. Chia seeds are rich in dietary fiber of branched chain polysaccharides, which absorb more water and allow slower sugar absorption in the body. Chia seeds contain 486 calories per 100 grams, or 138 calories per ounce. By weight, they are 6% water, 46% carbohydrates (of which 83% is fiber), 34% fat and 19% protein. One of the unique characteristics of chia seeds is their high content of heart-healthy omega-3 fatty acids. They are high in manganese, phosphorus, copper, selenium, iron, magnesium and calcium.

### Materials and Methods

#### Raw Materials

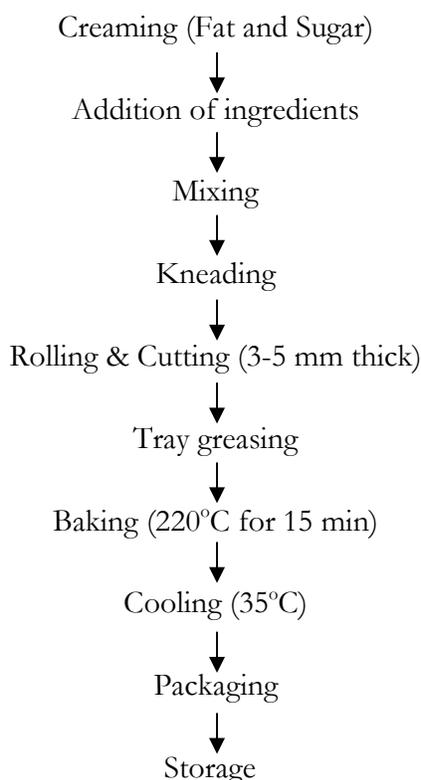
Important raw material will be wheat flour. Other materials like fine powdered cane sugar, vegetable fat, skim milk powder, baking powder, chia seeds, and common salt were procured from the local market of city.

### Preparation of Cookies

The ingredients are tested in laboratory to ensure material specifications are met. The tested ingredients are carefully weighed, mixed and kneaded to make dough. After mixing, the dough goes into the rolling process. In rolling process, dough is rolled down in thin sheets and cut into the desired size and shape by using cookies cutters or moulds. At the same time, stamp into the dough the name and design of the cookies. The shape and size of the cutter change

with each sort of biscuit. The remainder of the sheet of dough goes back to the next batch to be cut and the pieces are ready for baking.

The temperature of baking varies according to the type of biscuit. Greased the baking pan with vegetable fat. Place the pieces in baking pan and put in oven preheated to 220°C for 15 minutes. Properly baked cookies come out of the oven cooled to the temperature 35°C and then packed in LDPE (low density polyethylene). The finished packs are transferred to distribution.



### Formulation of Cookies

Ingredients (gms)	Level of addition of Chia Seeds (%)					
	Control	5%	10%	15%	20%	25%
Wheat Flour	100	100	100	100	100	100
Cane Sugar	50	50	50	50	50	50
Vegetable Fat	25	25	25	25	25	25
SMP	2.5	2.5	2.5	2.5	2.5	2.5
Baking Powder	1	1	1	1	1	1
Common Salt	1	1	1	1	1	1
Chia Seeds	---	0.5	1	1.5	2	2.5

### Analysis of Cookies

The moisture content, ash content, protein content & fat content was determined as per standard methods (AOAC, 2000). The cookies prepared by optimizing the levels of addition of chia seeds along with control cookies were subjected to

sensory evaluation for various quality parameters such as appearance color, taste, texture and overall acceptability by semi trained panel of judges with the help of nine point hedonic scale (1 for Dislike Extremely and 9 for Like Extremely). The data generated during the experiment were statistically

analyzed for their standard mean and standard deviation in triplicates as per the standards.

## Result and Discussion

**Table 1: Effects of levels of addition of chia seeds on physico-chemical characteristics of cookies**

Sample	Moisture (%)	Fat (%)	Protein (%)	Fiber (%)	Ash (%)
Control	3.3	24.9	8.1	17.3	24.9
5 % Chia Seeds	3.2	26.2	8.4	19.5	26.1
10 % Chia Seeds	3.1	28.9	8.9	23.5	26.7
<b>15 % Chia Seeds</b>	<b>2.9</b>	<b>30.2</b>	<b>9.2</b>	<b>25.1</b>	<b>27.0</b>
20 % Chia Seeds	2.8	32.7	9.6	26.0	28.7
<b>25 % Chia Seeds</b>	<b>2.7</b>	<b>34.6</b>	<b>9.8</b>	<b>27.6</b>	<b>29.8</b>

\*Each value is the average of three determinations

Table 1 revealed that Moisture content decrease with increase in chia seeds addition. Moisture content is highest in the control sample and that of lowest moisture content is found in 25% fortification. The ash content increases with increase in levels of addition of chia seeds. Ash content is highest in cookies prepared by adding chia seeds at the levels of 25%. Protein content is highest in cookies prepared by adding chia seeds at levels of 25% followed by 20, 15, 10, and 5%. The fat content increases with increase in levels of addition of chia seeds. Fat content is highest in cookies prepared by adding chia seeds at levels of 25%.

**Table 2: Effects of levels of addition of chia seeds on sensory characteristics of cookies**

Sensory Parameters	Control	Levels of addition of chia seeds (%)				
		5 %	10 %	15 %	20 %	25 %
Appearance	7.5	7.2	7.6	<b>8.5</b>	8.0	6.7
Colour	7.3	7.4	7.2	<b>8.3</b>	7.8	6.8
Taste	7.7	6.6	7.4	<b>8.2</b>	7.6	6.7
Texture	7.9	7.1	7.6	<b>8.2</b>	7.4	7.0
Flavour	7.8	6.8	7.2	<b>8.5</b>	7.6	6.9
Overall Acceptability	7.7	7.0	7.4	<b>8.4</b>	7.6	6.8

\*Each value is the average of 10 determinations

Table 2 revealed that as the level of addition increases the colour darkens giving unacceptable colour at 25% addition. Taste & Flavour parameter tells about the feeling of chia seeds, because of bitter taste & flavour it becomes unacceptable at 25% addition. The 25% addition makes texture (coarse, uneven) unacceptable. Compared to other samples overall acceptability of the cookies obtained is best for 15% addition. It reveals that the incorporation of 15% chia seeds was found to be superior to that of other incorporations. There was gradual increase in medicinal properties and organoleptic tests gave best results for level of 15% addition of chia seeds. Cookies fortified with chia seeds are rich in fiber, antioxidants and omega-3 fatty acids.

## Summary and Conclusion

The experiment was carried out with the different level of chia seeds and to check the increase

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