

## Research Article

# Sensory Acceptability, Nutritional Composition and Cost of Multigrain Sweet Biscuits

Singh Shipra\*, Paul Virginia and Singh Richa

Department of Food Nutrition and Public Health, Ethelind college of Home Science, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, 211007 (U.P.)

**Abstract**

In modern life stage people preferred fast food. Fast food prepared from refined flour. When change the eating pattern with multigrain flour then reduce the risk of disease. Multigrain flour from Oat, Pearl Millet, Maize, Ragi and Bengal Gram are a best way to found the nutrient. The objective to assess the organoleptic attributes nutritive value and cost of the prepared healthy food product. The value added product was prepared in four different combinations by replacing the amount of refined flour with the multigrain flour i.e. T<sub>1</sub> 85:15, T<sub>2</sub> 70:30, T<sub>3</sub> 55:45 and T<sub>4</sub> 40:60. Sensory evaluations of the sweet biscuits were done by the 9 point hedonic scale based score card. The nutritive of the sweet biscuit was calculated using food composition table. The experiment was replicated three times and the data obtained during investigation were statistically analyzed using analysis of variance (ANOVA) and critical difference (CD) techniques. Sensory evaluation of prepared product T<sub>4</sub> was highly acceptable on the basis of overall acceptability for Sweet biscuit.

The treatment T<sub>4</sub> was found to have the highest nutritive value with increase in protein (6.47g), fat (100g), calcium(50.60mg), iron(3.43mg) and fibre (0.99g) and also with highest cost though acceptable and reasonable as compared to market price. So it was concluded from the results that the value addition of incorporation of Multigrain flour at different level can improve the nutritional quality of sweet biscuit thereby enhancing the nutritive value of the sweet biscuits.

**Keywords:** Multigrain flour, Multigrain flour, healthy food, nutritive value, and cost

**\*Correspondence**

Author: Singh Shipra

Email: shippu789singh@gmail.com

**Introduction**

The multigrain flour products feature a combination of grains such as Oat, Pearl Millets, Maize, Bengal Gram, Ragi etc. with a beneficial nutritional profile and can contribute to weight management, reduce the risk of Cardiovascular disease, and bowel cancer.

**Oat (Jau)**

Oat can be a good source of vitamins, especially vitamin E and pantothenic acid. Oat in found  $\beta$ -Glucan is a soluble fiber readily available from oat grains that has been gaining interest due to its multiple functional and bioactive properties. Its beneficial role in insulin resistance, dyslipidemia, hypertension, and obesity is being continuously documented. It is believed that consumption of oats possesses various health benefits such as hypocholesterolaemic and anticancerous properties, the fact health effects of oats benefits mainly on the total dietary fibre and B-glucan content [1].

**Pearl millet (Bajra)**

Pearl millet is the most widely grown type of millet. pearl millet proteins are good sources of essential amino acids except lysine and threonine but are relatively high in methionine. Pearl millet is also rich sources of phytochemicals and micronutrients [2].

**Maize (Makka)**

It is the major source of energy and protein in the diet of many people. It contains vitamin C, A and K together with large amount of beta carotene and fair amount of selenium that helps to improve thyroid gland and play important role in proper functioning of immune system. It has higher content of protein and fat as compared to other cereals [3] but

lacks some other nutrients, such as vitamin B<sub>12</sub> and vitamin C, and is, in general, a poor source of calcium, folate, and iron [4].

### *Finger millet (Ragi)*

Finger millet is an important staple food in the eastern and central Africa as well as some parts of India. Incorporation of finger millets into the diets has preventive potential from chronic disease [5].

### *Bengal gram (Desi Chana)*

Bengal gram is a good source of minerals, protein and trace elements. Bengal gram flour may additionally improve the nutritional quality of the product. Cicer arietinum possessed aphrodisiac, estrogenic, antioxidant, antidiabetic, anti-inflammatory, hypocholesterolaemic, antidiarrhoeal, anticonvulsant, hepatoprotective, anticancer, diuretic, anti-nephrolithiasis and many other pharmacological effects. This review was designed to highlight the chemical constituents and pharmacological effects of Cicer arietinum [6].

## Materials and Methods

The present Study was conducted in the research laboratory of Foods Nutrition and Public Health department, ECHs, SHUATS, Allahabad. All the required raw materials were purchased from the local market of Allahabad. Multigrain flour was prepared by using some processing technique- Maize and Pearl millet grain were soaked overnight then these grain was dehydrated at 115<sup>0</sup>c for 12-24 hours [7]. Bengal gram was roasted in hot air oven at 115<sup>0</sup>c for 10-15 Minute. After dehydration and roasting grain were grinded into fine powder and utilized in the development of multi-grain flour [7]. The other grains like Ragi flour and Oats flour were purchased from the local market of Allahabad for the development of multi-grain flour. After processing 20% of each flour i.e. Pearl millet, Oat, Maize, Ragi and Bengal gram was taken for prepare of multigrain flour.

The control T<sub>0</sub> and four different treatments were prepared in which control (T<sub>0</sub>) was prepared by using 100% refined flour while four other treatment were prepared by utilization of refined flour and multigrain flour like T<sub>1</sub> 85:15, T<sub>2</sub> 70:30, T<sub>3</sub> 55:45 and T<sub>4</sub> 60:40. The experiment was replicated 3 times to get an average value. Sensory evaluation of the muffins for their acceptability was done by a panel of judges. The score card based on the 9 point Hedonic Scale [8]. The nutritive value of sweet biscuits was calculated by using the value of per 100 grams of each raw ingredient. [9]. Costs of the prepared sweet biscuits were calculated taking into account the cost of individual raw ingredients used in the preparation of food products as the prevailing market price. The data was statistically analyzed by using analysis of variance (two way classification) and critical difference technique. A significant difference between the treatments was determined by using CD (Critical difference) test. [10].

## Results and Discussion

### *Organoleptic Evaluation of the Prepared Multigrain Flour sweet biscuits*

**Table 1** shows that the sensory attributes in the multigrain Sweet biscuits illustrated that the according to overall acceptability of product treatment T<sub>4</sub> is more acceptable by the panel followed by Colour and Appearance, Body and Texture and Taste and Flavour using nine point hedonic scale. The sensory evaluation of the multigrain flour Sweet biscuits illustrated that the according to overall acceptability mean score of Sweet biscuits indicates that the treatment T<sub>4</sub> (8.14) scored maximum followed by treatment T<sub>0</sub> (7.42), T<sub>1</sub> (7.16), T<sub>2</sub> (7.3) and T<sub>3</sub> (8.13) respectively so T<sub>4</sub> is more acceptable by the panel of judges followed by different parameters of sensory, Color and Appearance, Body and Texture and Taste and Flavour. Hence From the ANOVA table of all three products that, it is evident that the calculated value of F is greater than the table value on 4,8 (d.f.) at 5% probability level so there was significant difference between treatments regarding all sensory Attributes of the product. [11] Overall acceptability of raw and roasted whole grain flour biscuits were recorded more than 8.0 in oat, barley, maize and wheat biscuits. However roasted wheat and roasted maize biscuits scored slightly less sensory score.

**Table 2** The range of energy content was 1,089.06 to 1,401.1 Kcal/100g which was higher than control. The maximum value 1,401.1 kcal/100g was observed in Treatment T<sub>4</sub>. Fiber content of the Sweet biscuits varied from 0.15 to 0.99 g/100g. The highest value 0.99 g/100g was observed in treatment T<sub>4</sub>. Protein content of the sweet biscuits was found to be in the range of 5.58 to 6.47 g/100g. The maximum value 6.47 g/100g was observed in Treatment T<sub>4</sub>. Results showed that fat content of the sweet biscuits was in range of 100g/100g in all treatment. The constant fat

value was found in Treatment with addition of Multigrain. CHO content of the muffins was found to be in the range of 116.50 to 113.54 g/100g. The maximum value 116.11 g/100g was observed in Treatment T<sub>1</sub>. Iron content of the muffins was in range of 1.47 to 3.43 mg/100g. The maximum value 3.43 mg/ 100g.was found in Treatment T<sub>4</sub>. Calcium content of the sweet biscuits was found to be in the range of 21.55 to 50.60 mg/100g. The maximum value 50.60 mg/100g was observed in Treatment T<sub>4</sub>. Summarizes the average nutritive value of energy, fiber, protein, iron, and calcium content in the muffins of T<sub>4</sub> was greater than other treatments, the fat was constant in all treatments and carbohydrate was higher in T<sub>1</sub> compare to T<sub>2</sub>, T<sub>3</sub>, and T<sub>4</sub>. According to [12] Pearl Millet and Finger Millet biscuits had significantly higher fiber content both in raw and roasted biscuits. Fiber content of the biscuits both from raw and roasted samples varied from 0.51 to 1.59 % which is within the acceptable limit for the cookies. Fiber absorbs large amount of water, it gives a sensation of fullness.

**Table 1** Average of different treatments of sensory score of Multigrain Sweet biscuits

Control and Treatments	Colour and Appearance	Body and Texture	Taste and Flavor	Overall Acceptability
T <sub>0</sub>	7.76	7.56	7.26	7.42
T <sub>1</sub>	7.2	7.03	7.33	7.16
T <sub>2</sub>	7.8	7.23	7.2	7.3
T <sub>3</sub>	8.33	8.43	8.33	8.13
T <sub>4</sub>	8.26	8.6	8.13	8.14
Result	S	NS	S	S

**Table 2** Average percentage of nutrients in control and treatment sample of Sweet biscuits

Treatments	Energy (kcal)	Protein (g)	Fat (g)	CHO (g)	Fiber (g)	Iron (mg)	Calcium (mg)
T <sub>0</sub>	1,089.06	5.58	100	116.50	0.15	1.47	21.55
T <sub>1</sub>	1,399.06	5.80	100	116.11	0.36	0.48	29.43
T <sub>2</sub>	1,399.74	6.02	100	115.26	0.57	1.25	36.66
T <sub>3</sub>	1,400.42	6.24	100	114.40	0.78	2.34	40.52
T <sub>4</sub>	1,401.1	6.47	100	113.54	0.99	3.43	50.60

#### **Cost of the Sweet biscuits Based on the Raw Materials**

Total cost of *Sweet Biscuits* per 100g of dry ingredients at the prevailing cost of the raw materials was T<sub>0</sub> is Rs. 19.94 for treatment, T<sub>1</sub> is Rs. 20.55, T<sub>2</sub> is Rs. 21.16 T<sub>3</sub> is Rs. 21.77 and T<sub>4</sub> is 22. 38. It is therefore concluded that the control T<sub>4</sub> has the highest cost and T<sub>0</sub>, T<sub>2</sub>, T<sub>3</sub>, and T<sub>4</sub> has the lowest cost because the incorporation level of Multigrain flour did Increase the cost of the prepared products marginally.

#### **Conclusion**

It is concluded that the Multigrain Flour (Maize, Pearl Millet, Oat, Ragi and Bengal Gram) enhance the nutritive value of Sweet biscuits. Most of the Indian Snacks like sweet biscuits can be successfully incorporated with Multigrain Flour to enhance the sensory properties of the products. Sensory evaluated of prepared products T<sub>4</sub> (40:60) was highly acceptable on the basis of overall acceptability for Sweet biscuits. Cost was increased marginally in all treatment of prepared products comparatively control.

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