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Shelf Life Study of a Standardized Nutritious Sugar Free Brownie

Misbah Khan
Student, Department of Food Science and Nutrition,
Dr. B.M.N. College of Home Science, Matunga, Mumbai, Maharashtra, India
Nayab Khan
Student, Department of Food Science and Nutrition,
Dr. B.M.N. College of Home Science, Matunga, Mumbai, Maharashtra, India
Anuradha Shekhar
HOD, Department of Food Science and Nutrition,
Dr. B.M.N. College of Home Science, Matunga, Mumbai, Maharashtra, India

Abstract:
The competing demands of taste and health pose a dilemma for consumers as well as the food industry. Consumers are looking for tasty, healthy food based products which might not harm, but may prove to be beneficial for their health. Healthy foods may be formulated with addition of various functional foods, in order to make it palatable and frequently consumable. In the present study an effort has been made to make a nutrient rich eggless, sugar free brownie which was standardized to cater to people who are health conscious and also for diabetic patients who look for sugar free alternatives. Nutri-brownie was prepared with oats, dates, coconut, walnuts, etc. The product is rich in iron, dietary fibre, protein and omega 3 fatty acids. A shelf life study was conducted on the product using sensory evaluation by scoring method on a five-point scale for a period of 6 days by a semi trained panel. Other aspects discussed in the study include designing a nutritional label, packaging, budgeting and marketing aspects. The maximum shelf life of the product was 4 days in ambient temperatures.

Keywords: *Oats, Sugar free, Dates, Brownie, Iron, Shelf life study.*

1. Introduction

The nutri-brownie is a healthy alternative to the regular brownies. The brownie is rich in calories and provides a good satiety value. The product is targeted for the general crowd but can be consumed by patients suffering from constipation, diabetes, hyper cholesterolemia, etc. The brownie is made up of whole wheat flour, oats, desiccated coconut, walnuts and dates which are all rich in fiber, proteins, beta glucans and antioxidants. It is eggless and contains milk and curd for binding the ingredients together due to which it can be consumed by vegetarians as well. The base of this product is whole wheat flour instead of regularly used refined flour. Whole wheat flour contains more fiber and is richer in antioxidants as compared to refined flour[1]. Oats is another major ingredient of this product. Oats contain beta glucans and high amounts of soluble dietary fiber both of which have a positive effect on decreasing total cholesterol and low density lipoproteins (LDL) [2]. Oats consumption also has a beneficial effect on glucose control and patients with type two diabetes[3]. Due to having good amounts of oats and whole wheat flour, this brownie provides good amount of soluble dietary fiber which helps in constipation and provides satiety to the consumer [4]. Sweetness of the brownie was provided by using dates. No pure sugar or honey is used in the product. Dates are rich in potassium, iron and vitamin B6 [5]. Consumption of dates also shows a low glycemic index and do not lead to any significant postprandial glucose excursions due to which the product can also be consumed by diabetic patients along with a healthy balanced diet[6]. Another ingredient used in this product is walnuts. Walnuts help in decreasing blood pressure and controls LDL [7]. Walnuts are also rich in vitamin E, polyphenols and contain poly unsaturated fatty acids which help in reducing oxidative stress, improve cardiovascular health and have large antioxidant capacity [8, 9].Other than these, the brownie also contains desiccated coconut, cocoa powder and vanilla essence. Therefore, one brownie provides the consumer with maximum energy, fiber, iron and other nutrients. It is also safe for consumption by diabetic patients.

Figure 1

2. Objectives

- To standardize a healthy and innovative snack
- To develop a Nutrition label.
- To identify and develop an eco-friendly packaging.
- To understand all aspects of Budgeting.
- To conduct a shelf life study on the product by sensory evaluation.
- To develop various entrepreneurship skills.

3. Methodology

The aim was to create a sweet snack healthy enough for consumption by the diabetic as well as other population. Many desserts and baked products were thought of namely slice cakes, dry fruit rich muffins and brownies. Out of these, the brownie was selected and a nutritious brownie was prepared. Sensory evaluation was carried out on the prepared brownie and based on the sensory evaluation scored and acceptability, the nutri-brownie was selected as the final product. The nutri-brownie is some healthy dessert snack rich in fiber, iron and omega-3 fatty acids. The product was also packed using eco-friendly packaging and sold. A shelf life study was later conducted on the product using sensory evaluation.

4. Materials used (Ingredients)

Whole wheat flour, oats, cocoa powder, baking soda, baking powder, salt, dates, vanilla essence, oil, curd, milk, walnuts and coconut.

5. Product before Standardization

Ingredients	Amount
Whole wheat flour	120 gms
Dates	1 kg
Oats	50 gms
Cocoa powder	75 gms
Curd	240 gms
Milk	120 ml
Baking powder	2.5 gms/ ½ tspn
Baking soda	5 gms
Salt	¼ tspn

Table 1

The product prepared before standardizing the recipe was evaluated by 25 panelists through sensory evaluation. A score card method was used. A five-point scale was maintained ranging from poor to excellent with characteristics of taste, texture, after taste, sweetness, flavor and overall acceptability.

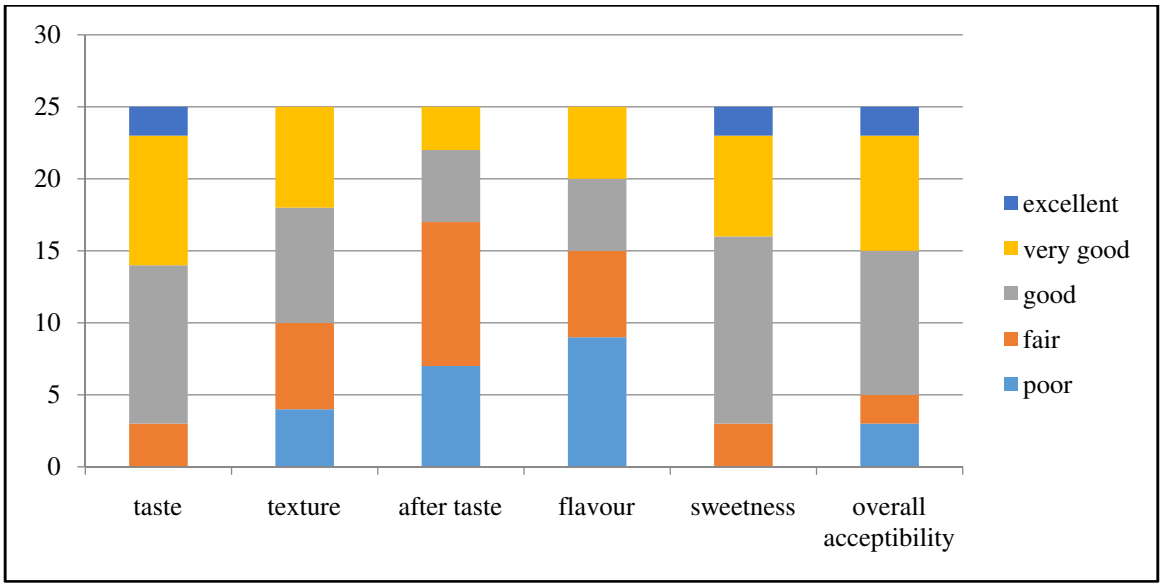

Figure 2

It was observed through sensory evaluation scores that the product had an off flavor and also an after taste of whole wheat and oats. It was also observed that the texture of the product was fudgy and not up to the mark.
Therefore, the product was standardized again by adding dry coconut powder and reducing the amount of dates used. Walnuts were also added as garnishing agents to improve the appearance of the product.

6. Product after Standardization

Ingredients	Amount
Whole wheat flour	120 gms
Dry coconut powder	60 gms
Walnuts	25 gms
Dates	500 gms
Oats	50 gms
Cocoa powder	75 gms
Curd	240 gms
Milk	120 ml
Baking powder	2.5 gms/ ½ tspn
Baking soda	5 gms
Vegetable oil	3 tbsp
Vanilla essence	1 tspn
Salt	¼ tspn

Table 2

The product prepared after standardizing the recipe was again evaluated by the same 25 panelists through sensory evaluation. A similar score card method was used. A five-point scale was maintained ranging from poor to excellent with characteristics of taste, texture, after taste, sweetness, flavor and overall acceptability.

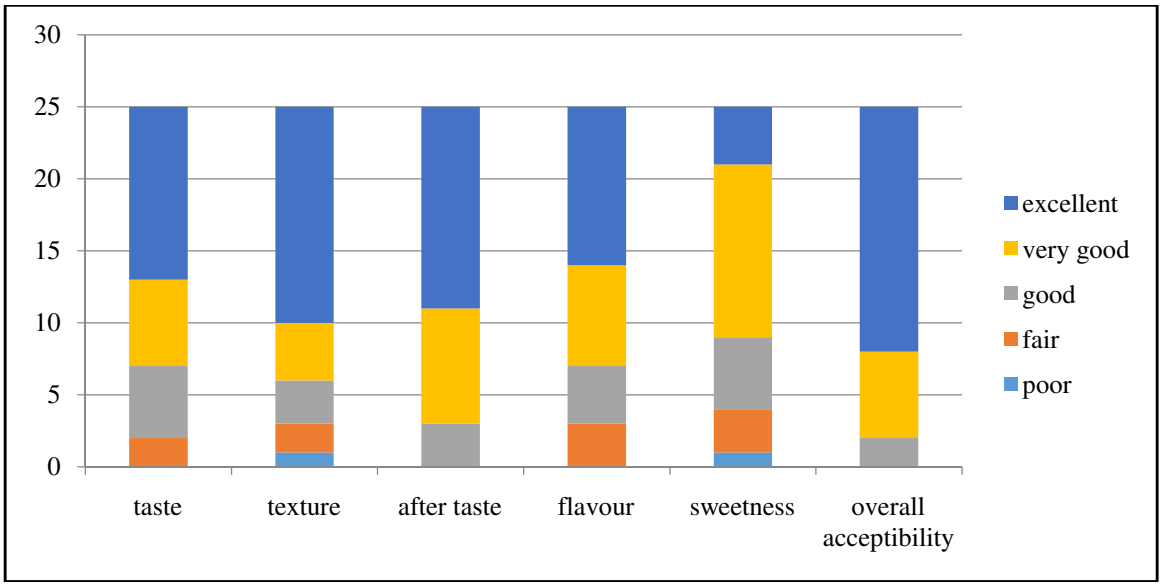

Figure 3

By sensory evaluation scores, it was observed that this product had much better acceptability than the previous one. Therefore, this was selected as the final standardized recipe for the nutri-brownie.

7. Method of Preparation

i. Preheat the oven to 180 degrees C and line a 12-inch x 9-inch tin with baking paper.
ii. Chop the dates and grind them using a little water in order to make a paste.
iii. Take whole wheat flour, oats, cocoa powder, coconut, baking soda, baking powder and salt in a bowl and mix well.
iv. Mix curd, vanilla essence, dates paste and oil in another bowl.
v. Pour the wet ingredients mixture into the dry ingredients and mix well using a hand or an electric beater. Make sure no lumps are formed. Add milk in small quantities to make sure the batter is not dry and lumpy.
vi. Pour this batter into the baking tin.
vii. Bake the brownies in the oven for 20 minutes at 180 degrees C till a skewer inserted comes out clean.
viii. Remove from the oven and allow it to cool for 15 minutes. Invert the brownies on a plate and cut into squares.

8. Packaging

A suitable ecofriendly packaging material had to be identified and selected for packaging of the product. Several options were thought of namely recycled paper, virgin dye-free paper, unbleached parchment paper, etc. out of these unbleached parchment paper[10] was selected as the primary packaging material. Parchment paper is moisture resistant, ecofriendly, cheap and also provides UV protection to a certain extent[11, 12]. Each brownie was wrapped in parchment paper and then put in a handmade paper bag made of chart paper. Chart paper boxes of various colors like blue, green, red and yellow were used to make the packaging look attractive. These boxes can also be recycled.

Figure 4

9. Shelf Life Study

After packaging of the product, a shelf life study was conducted on it using sensory evaluation. The product was evaluated by 25 panelists on the first and fourth day after its packaging. Sensory evaluation was conducted using scoring test method. A five-point scale was maintained with characteristics like flavor, sweetness, after taste, texture, taste and overall acceptability. Each panelist rated every characteristic out of 5. The mean scores of every characteristic were taken and a graph was plotted.

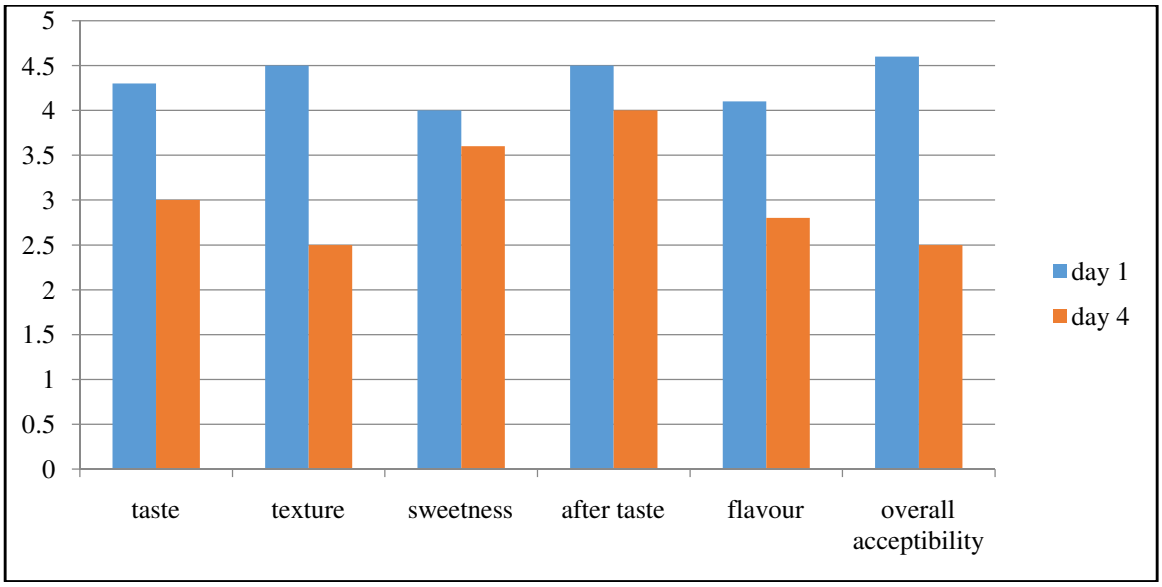

Figure 5

It was observed through the graph that the product had started to deteriorate and overall acceptability levels had started to go down. Appearance wise also the product had changed color. It was observed to be a little darker than what it was on the first day. The texture of the product had started to get grainy and gave an off flavor. However, not many changes were observed in sweetness of the product. Also there was no after taste observed in the product. After the 6th day of packaging, the product was found to be unfit for consumption as it gave a rancid smell which can be due to oxidation of fats in it. Considering all the results, the product was labeled as edible before 4 days from packaging.

10. Nutritional Label

Nutrient	Amount
Energy	107 kcal
Protein	2.6 grams
Calcium	34 mg
Fiber	1.2 mg
Iron	0.73 mg

Table 3

A nutritional label was designed for per piece of the product which had all major nutrient amounts on it[13]. It also had other important information like ingredients, manufacturing date, net content, vegetarian mark and best before date. A product label was also designed bearing the name of the product.

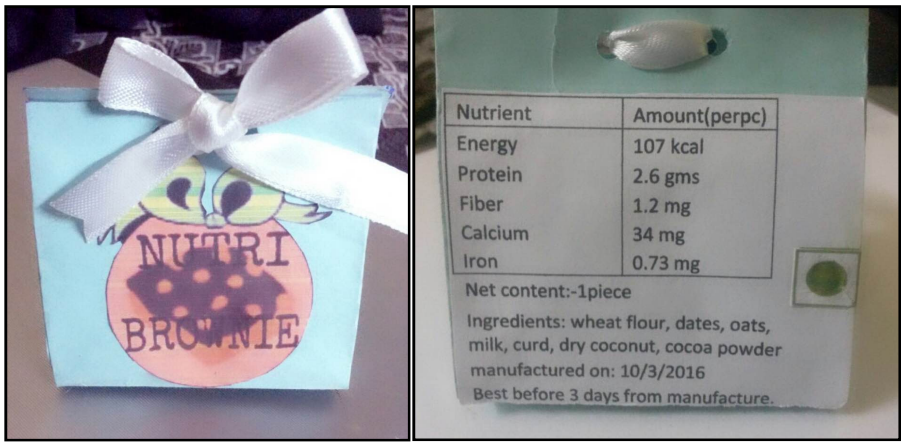

Figure 6

11. Budgeting

Materials	Amount (rupees)
Whole wheat flour	6
Dates	55
Oats	9
Walnuts	35
Dry coconut powder	10
Cocoa powder	10
Milk	9
Curd	25
Vanilla essence	3
Baking powder	1
Baking soda	4
Salt	0.17
Packaging material	59
Nutritional label	20
Total	246.17

Table 4: cost per 25 pieces

The material cost of 25 pieces was 246.17 rupees. Per piece cost was estimated to be 10 rupees. Other charges were later added including cost of electricity, room rent, labour, etc. Therefore, per piece cost of the nutri-brownie was 15 rupees.

12. Marketing

The selling price of the product was 20 rupees per piece. Random people from different age groups were questioned on whether they would like to buy a product like this. Based on the feedback, a target group of age group 16-40 was selected. This group was selected as it is easily approachable, health conscious and interested in learning about new products. A stall was later setup in the campus of Dr. B.M.N. College of Home Science with banners put up about the product. The attractive and colorful packaging of the product made it easier to sell. The entire batch of 25 pieces was sold and a profit of 125 rupees was made. The feedback of the customers was also noted.

13. Conclusion

The nutri-brownie is a healthy and innovative snack which is fit for consumption by diabetics. The product is also rich in iron and dietary fiber which makes it a healthy alternative for the regular brownies. The product is also observed to be highly acceptable in the market and can be taken up start an entrepreneurship for innovative snacks. The shelf life of the product needs further improvement which can be done by adding certain preservatives. It is also observed that due to baking powder used as a leavening agent in the product, all the B-complex vitamins from dates, whole wheat and other ingredients get destroyed[14]. Further study can be conducted with regards to this.

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