



# Food Product Development And Shelf-Life Study Of Calcium Rich Cookies Made With Amaranth Flour, Dried Dates And Nuts

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## Abstract

Nowadays, calcium deficiency is commonly seen in all stages of life, so intake of dietary calcium from calcium-rich food sources such as amaranth flour, dried dates, and nuts is one strategy to boost calcium levels in humans. This could be a beneficial way to decrease calcium insufficiency. Cookies are soft and chunkier versions of biscuits, and this project was an attempt to make them by combining the above-mentioned ingredients. The cookies available in the market are made from various refined flours, having a high content of sugar, trans fats, preservatives, etc. These cookies are calcium-rich, contain fibre, proteins, and carbohydrates, and have anti-inflammatory properties. These cookies will benefit and be helpful for multiple health problems. The objective of this study is to develop a healthy cookie with high calcium content and label it as "healthy bites." They will also be sensory evaluated periodically to study its shelf life. The study will also explore on other aspects such as packaging, nutritional labelling, budget, and marketing aspects.

**Keywords:** Calcium intake, amaranth flour, dried dated, nuts, sensory evaluations.

## 1 .Introduction

Calcium is a mineral that is most commonly linked with healthy bones and teeth; it also plays a crucial part in a variety of biological activities. It is essential to maintain serum calcium level for bone formation, changes in bone size during growth, repair injury, and provide a supply of other minerals. Children and adults aged 16 to 18 years have the highest dietary requirement for calcium in the body, and after that, lactating, menopausal, and pregnant women will also require high calcium intake. Women lose approximately 1% of their bone mineral density (BMD) per year after menopause on average, these changes lead to decreased bone mass and weak bones over time.(1) (2) Adults may also have lower bone mass, which increases their risk of osteoporosis. According to RDA 2020, India's average calcium intake is as low as 300-600mg per day, although the EAR (Estimated Average Requirement) claimed that 800mg calcium is required for adults and 400mg for children aged 1-3 years, with the amount increasing with age. The prevalence of calcium deficiencies is seen in many countries with various conditions and health

problems, so to reduce this, every individual should focus on their daily calcium intake and consume more calcium-rich supplemented foods in their diet.

Cookies with various flour compositions are now entering the market. Cookies are popular as snacks because of their special taste, flavours, crispness, texture, and convenience. It is mostly liked by individuals of all ages, especially children. Generally, cookies are made with wheat flour, but they lack some essential amino acids like lysine and tryptophan, so adding amaranth flour to the cookie composition can increase its nutritive values since amaranth flour is rich in lysine and tryptophan. Amaranth is considered a super food, and it possesses nutrient-dense food properties. It also contains a high amount of calcium, fibre, magnesium, phosphorus, and carbohydrates.(3) (4)

Along with these flour compositions, nuts like dried date powder, coconut powder, almond crust, cashew crust, and gingelly seeds have been added which can provide more calcium and protein content. Dried dates have a low glycemic index and have antioxidant and anti-inflammatory properties. Dry coconut powder is also helpful for a good immune system, skin, bone health and can prevent anaemia.

### The objective of the study is

- 1) To standardize an innovative nutritious product which is cost effective as per consumer acceptance.
- 2) To investigate the product's shelf life through sensory evaluation.
- 3) To create an innovative nutritional label.
- 4) To select a packaging material.
- 5) To understand the budgeting and marketing aspects and to develop entrepreneurship skills.

## 2. Materials and method

### 2.1 Ingredients for standardization

For making the cookies following ingredient were used

Ingredients	Amount in (gms)
Amaranth flour	30
Wheat flour	20
Dried dated powder (Kharak)	20
Coconut powder	20
Almond	5
Cashew	5
Gingelly seeds	10
Butter	10
Sugar powder	10

(Table no. 2.1)

Additional ingredients were cocoa powder, cardamom powder, milk, baking powder.

The key ingredients used to make the cookies were amaranth flour, wheat flour, dried dates powder, and coconut powder. Two trials were conducted due to the hardness of cookies, therefore in the second trial; wheat flour was used to achieve crispiness or crunchy texture in cookies.

**Table 2.2: Two trails showing the ingredients for standardizing the cookie**

No. of trials	Amaranth flour (gm)	Wheat flour(gm)	Dried dated powder(gm)	Coconut powder(gm)
T1	30		30	20
T2	30	20	20	20

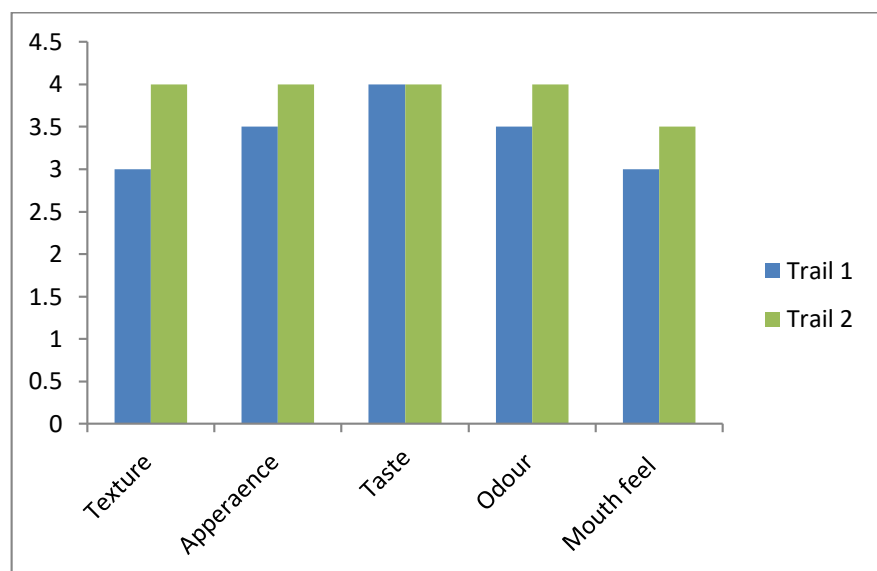
The second cookie was accepted and was further studied for its shelf life.

### 2.2. Steps to prepare the standardized product:

- Measure the amounts of the main ingredients and pour them into the mixing bowl.
- Add amaranth flour, wheat flour, dried dates (kharak), coconut powder and mix them properly in a big bowl.
- After adding the main ingredients in the bowl, add almond crust, cashew crust, gingelly seeds, cocoa powder, and cardamom powder to the same mixture.
- On the other hand, take one small bowl and mix butter and sugar powder thoroughly. So, sugar can be easily mixed into the dough.
- In a large mixing bowl, combine both mixtures.
- Start kneading the dough; while kneading, add a very small amount of milk to adequately bind the dough. Ensure that the dough is neither too tough nor too soft.
- Make little balls with wet hands and mould them into circular shapes to fit the size of cookies. Place it in an ungreased baking tray.
- Preheat the microwave for 10 minutes at 50 degrees Celsius, and then set the cookie tray in the microwave. Bake until the edges are golden brown. 10–12 minutes

### 3. Sensory Evaluation of the product

A sensory evaluation was performed to determine whether the product is acceptable by the consumer. A semi-trained panel of 10 panellists assessed the sensory quality of cookies. A 5-point scoring test was used to determine the flavour, texture, sweetness, and overall acceptability. Ten evaluators were given a 5-point scale to score each attribute from 1 to 5, with 1 being poor and 5 being excellent.



**Fig.2.1 Sensory Evaluation scores for Trial 1 and 2**

The above graph represents the scores for both the trails of the cookies given by 10 panellists out of 5 points.

Texture, odour, and oral freshness scored better in the second trail compared to the first. Texture improved on adding wheat flour, which gives a better crunch to the cookies, and odour improved by adding extra cardamom powder, which was also present in the first trail but in a very little quantity.

### 4. Shelf-life study of the product

A product's "shelf life" generally means the length of time you can expect a product to look and act as expected and to stay safe for use. After the two trials of the food product, the second one which was the standardized recipe was kept for shelf-life testing in normal room temperature after packing it. The trial was conducted in the time span of 3 weeks. Each criterion was scored out of 5 (1 being Poor to 5 being Excellent) after each week.

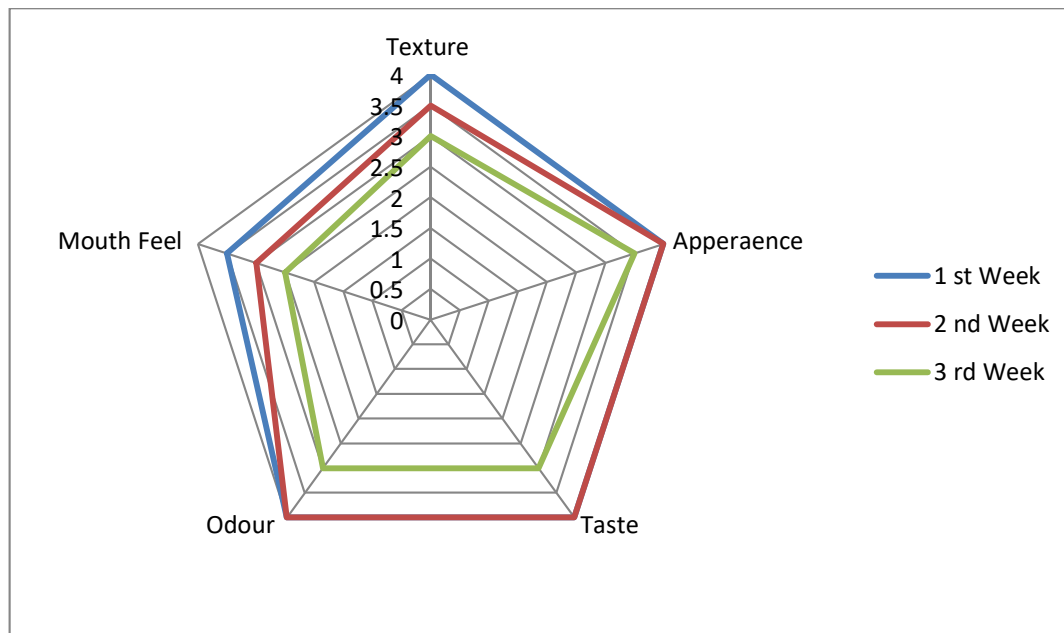


Fig 4.1: Shelf-life web design of the two trails over a period of 3 weeks.

**Week 1:** The product remained as it is without losing its original colour, appearance, taste, texture, odour, and mouth feel.

**Week 2:** The mouth feel and texture of the cookies seemed to slightly alter, as we can observe from the graph from a score of 4 it went down to 3 and 3.5. Other characteristics, such as appearance, taste, and odour, remained constant.

**Week 3:** The product seemed to start losing its original characteristics after the third week, for eg texture, taste, and odour got a low score of 3, there has been no significant changes observed in appearance, but mouth feel was seen to reduce to a score of 2.5.

From the shelf-life study as represented in Fig 3.1, it can be noted that the product stayed best before two weeks of manufacture. Note that the product when removed from the packet needs to be consumed immediately (within half an hour) and should not be left open as it reabsorbs moisture from the environment and becomes soft and loses its crispness.

## 5. Packaging

Food packaging is described as containing food in order to protect it from contamination by physical, chemical, and biological factors. Plastic packaging is the most popular and inexpensive method of packing food products. It allows protecting, preserving, store, and transporting products in a variety of ways. (5) Without plastic packaging, a great number of products that consumers purchase would not make the journey to the home or store, or survive in good condition long enough to be consumed or used. Cookies were packed into small-sized plastic pouches or bags after 25–30 min of cooling. The manufacturer of plastic bags claims that the bags are eco-friendly and 100% recyclable. These bags are made of 51-micron thick high-density polyethylene plastic (HDPE), which will stay intact and can, be collected and recycled. It is cost affective and also has excellent clarity, transparency, and gloss.



**Fig 5.1 Packaging material**



**Fig 5.2 Packed food product**

## 6. Labelling

Food labelling provides information to consumers on the composition, ingredients, and nutritional value of packaged foods for sale. In particular, nutritional labels help consumers evaluate food products in the market by seeing the bioavailability of specific nutrients and making healthier choices for themselves.(6)

The nutrition label for Healthy Bits cookies was designed to provide information about nutrients as well as the overall benefits of the product. The product name and the fact that it is 100% veg are included on the front label. The back label had information such as net weight, price, and production date, as well as nutrient composition such as energy, carbohydrates, protein, fibre, fats, and calcium. The label also includes the ingredients, storage instructions, and the contact information of the food product developer.





Fig6.1 Front label

**Healthy Bites**  
CALCIUM RICH COOKIES

**Ingredients:** Amaranth(Rajgeera) flour, Wheat flour, Dry dates, Dry coconut powder, Gingelly seeds, Almonds, Cashew, Butter, Sugar powder, Cocoa powder, Cinnamon powder, Milk

Nutritional Facts per 100 gm	
Energy (kcal)	476
Calcium (mg)	262
Protein	12
Fibre	10
Carbohydrates	42
Fat	11.4
Sugar	10

**\*No added colouring and preservatives**

- Keep away from direct sunlight
- Stored in cool and dry place
- consume the product as soon as pack is opened

Net Wt. 100 gm  
Price: 20/-  
Mfd : 09/03/2022

Contact Food Product Developer:  
jyotikadam020401@gmail.com

Fig 6.2 Nutritional label

#### 4. Budgeting

Expenditure	Expenditure Cost (Rs.) of 20 pack of 100g
Ingredients	260
Packaging	40
Labelling	30
Miscellaneous	20
<b>Total</b>	<b>350/-</b>

Table 4.1 budgeting for food products

Table 4.1 shows the total price of raw ingredients, packaging, labelling, and miscellaneous expenses for 20 packets. The products sales prize was for Rs. 20/-per packet, with each packet containing 5 cookies. A total of 20 packets were sold. After selling the product, the total amount collected was Rs. 400, of which Rs. 50/-was the total profit. If 2000 packets are sold 5000/- would be the profit margin.

## 8. Marketing:

A food festival was held on the college campus to promote the product. Cookies were kept in food stalls for marketing. Every customer was informed about the food product's unique features and benefits. Cookies were purchased by college students, teachers, and non-teaching staff.

## 9. Conclusion:

Healthy Bites cookies, which are high in calcium, fibre, and protein, will be a healthy snacking option for people looking out for snacks on the go. It can be eaten by all age groups, and is especially recommended for lactating women. The product has a 2-week shelf life and can last up to two weeks if stored properly, but once the package is opened, the food must be consumed immediately. These healthy cookies are enhanced with dry fruits, which will give them a nutty, sweet taste while eating.

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