



Development of calcium-rich product- “Multipro Ragi Premix”

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ABSTRACT

Over the years there has been a drastic change in the life style of consumers, there is a rising demand for nutritionally rich, easy to prepare dishes and also the shift of mindset to obtain nutrients through food for sustenance. Premixes are one such category of food. The present study was conducted to understand the acceptance of a preservative free, simple and nutritional blend that is cost-effective. The product “Multipro Ragi Premix”, has a unique blend of ragi, dates, flax seeds and oats. This makes the product calcium-rich, gluten-free and even suitable for lactose-intolerants. The acceptance was studied by conducting a sensory evaluation using the hedonic method based on a 9-point scale. The Evaluation was performed on sensory attributes like appearance, color, taste, texture, aroma, and the overall acceptability of the product. As per the RDA laid by ICMR, the product tends to serve 27% of the daily required calcium. Estimation of the Storage study data determined that it has a shelf life of minimum four weeks.

Keywords— Calcium-rich, Premix, Gluten-Free, Lactose-Intolerant, Ragi, Dates, Nutritional blend, Calcium-deficiency, Sensory Evaluation

1. INTRODUCTION

Calcium is an essential nutrient necessary for many functions in the human body; dietary requirements of which vary slightly by population group, age, gender. It is the most abundant mineral in the body with 99% found in teeth and bone. Ensuring adequate calcium is consumed is important for achieving peak bone mass (PBM) and helping to reduce bone mineral losses in advancing age. (19). Inadequate intake of calcium leads to hypocalcemia. Long term calcium deficiency leads to a higher risk of fracture, osteoporosis, muscle spasm, brittle nails etc.

Calcium can be obtained from Calcium-rich foods and are often a preferred source for obtaining Calcium. For individuals who cannot meet their calcium needs from their diet alone, they are advised to consume foods fortified with calcium or calcium supplements are an option. (17)

The purpose of developing “Multipro Ragi Premix” is to provide consumers with an option of fulfilling their calcium requirement through food. The product is suitable for lactose and gluten intolerants. No sugar is added to the product and it is free from preservatives. A major highlight of the product is the high level of calcium. As per the RDA given by ICMR, the product tends to serve 27% of the daily required calcium.

This premix is designed keeping in mind the likeliness Indians have towards sweet.

1.1 Ingredients

1.1.1 Finger Millet: Finger Millet has many nutraceutical properties that are helpful to prevent many health issues including CVD, lowering blood pressure. Finger millet is a rich source of minerals and dietary fibres. Studies have shown it contains 344 mg of calcium per 100gm of finger millet.

1.1.2. Oats: Dietary inclusion of oats provide beneficial effects to health because of rich Macro and Micronutrients, soluble and insoluble fibre. It contains unique antioxidants, avenanthramides as well as tocotrienols and tocopherols. Oats have shown to exert cardiovascular benefits that go beyond its cholesterol-reducing properties. (5, 16, 23)

1.1.3. Flaxseed: Flaxseed is one of the most important oilseed crops, rich in omega-3, digestible proteins and lignans. It is an essential source of high-quality protein and soluble fibre. Flaxseed is emerging as an important functional food because of its rich content of a-linolenic acid(ALA). (14)

1.1.4. Dates: Sugar in dates are the most prevalent compounds as they provide rich source of energy. (4). Dates are regarded as a reasonable source of vitamins. It is considered as a moderate source of riboflavin, niacin, riboflavin and folate. It is also a good source of sodium, potassium, magnesium, calcium and iron. Dates have phenolic compounds and flavonoids that provide antioxidant activities. (1)

1.1.5. Permitted Artificial Flavour.

2. METHODOLOGIES

2.1 Materials: Ragi, Dates, Oats, Flax Seeds were procured from the market. Permitted artificial flavour was also added to the product.

2.2. Method

2.2.1. Cleaning: All the raw materials were taken and cleaned to remove the dirt, stones, chaff and other foreign particles.

2.2.2. Roasting/Grinding: Ragi, Oats and Flax Seeds were roasted for about 5 minutes. The Roasted ingredients were then cooled and along with dates were then ground into a fine powder to make the premix.

2.2.3. Method of Preparation:

This premix can be prepared in various forms such as porridge, ragi halwa, barfi, fudge etc. just by adding minimal additional ingredients to it. Heat the pan, add 2 tablespoon of ghee. Empty the content of packet and roast for 2 minutes. Following are the recipe suggestions for the premix.

2.2.3.1. Halwa: Add 225 to 250 ml of lukewarm water, mix well and serve.

2.2.3.2. Porridge: Add 400 ml of milk (of your choice) to it. Let it cook for 2 to 3 minutes on medium heat, take off heat when desired consistency is reached. Serve hot.

2.2.3.3. Barfi: Add 200 ml of water along with 50 ml of condensed milk, stir well. Cook until the mix start leaving the sides of the pan. Cool the mixture and cut it into desired shape and serve.



Fig. 1: Multi-pro Ragi Premix

3. PROXIMATE EVALUATION OF THE PRODUCT

3.1. Estimation of moisture content

The moisture content of the product was determined by the Oven-Dry Method. The sample was pre-weighed and kept in a hot oven for 2 hours to calculate the total amount of moisture present.

3.2. Estimation of ash content

The Ash Content for the product was evaluated by using a Muffle Furnace. The sample was weighed and incinerated to remove the carbon molecules from the product and ignited at 550°C in the Muffle Furnace.

3.3. Estimation of carbohydrates

The Carbohydrates Content was determined by subtracting from 100 the sum of the values of moisture, protein, fat, ash, and crude fiber.

3.4. Estimation of proteins

The Protein content was evaluated by using the Kjeldahl method. The Nitrogen Content of the sample was determined by Digesting, Distillation and Titration against the working standard and the amount was multiplied by a factor of 6.25. Methods described in A.O.A.C.

3.5. Estimation of fats

Fat Content of the product was evaluated by using the Soxhlet method. Crude fat was determined using the Soxhlet extractor and Petroleum Ether as a solvent. Methods described in A.O.A.C.

3.6. Estimation of crude fiber

Crude Fiber was evaluated by Acid-Alkali Hydrolysis method described in A.O.A.C.

3.7. Estimation of energy content

Energy content was determined by multiplying the Crude Proteins, Crude Carbohydrates and Crude Fats by water Factors 4, 4 and 9 respectively.

$$\text{Energy(Kcal)} = [\text{Carbohydrate(g)} \times 4\text{Kcal/g}] + [\text{Protein (g)} \times 4\text{Kcal/g}] + [\text{Fats(g)} \times 9 \text{Kcal/g}]$$

4. EVALUATION OF CALCIUM

Calcium was estimated by EDTA (Ethylenediaminetetraacetic acid) Titration Method.

5. MICROBIAL EVALUATION OF THE PRODUCT

The estimation of Microbial load was done using Total Plate Count Method. The samples were prepared using serial Dilution Method. To determine the Bacterial & Fungi and Mould counts, the sample were spread onto Nutrient Agar plate & Sabouraud's Plate respectively.

6. SENSORY EVALUATION OF THE PRODUCT

The Sensory evaluation of the product was determined by using the 09-point hedonic scale for various sensory parameters such as the:

- (a) Appearance & Color (visual sense)
- (b) Texture (tactile sense)
- (c) Odour (olfactory sense)
- (d) Taste & Mouthfeel (gustatory sense)

7. RESULT AND CONCLUSION

7.1. Evaluation of Proximate Analysis

Parameters	Quantity per 100g
Energy	290.76 Kcal
Carbohydrate (g)	59.26g
Proteins (g)	0.02g
Fats (g)	5.96 g
Ash	2.20
Moisture	6.94
Crude Fiber	10.85

7.2. Evaluation of Calcium

Parameter	Quantity per 100g
Calcium	180 mg

7.3. Evaluation of Microbial Analysis

The microbial load of the sample on both the Nutrient Agar and Sabouraud's Agar plate was found to be less than 30 CFU.

7.4. Evaluation of Sensory Analysis

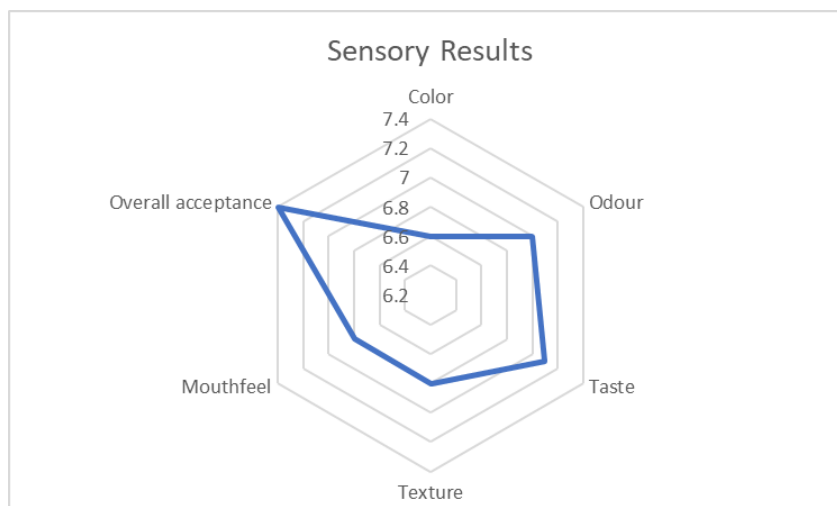


Fig 2: Result of sensory evaluation (Radar Diagram)

8. FOOD LABELLING AND PACKAGING

8.1. Packaging

The packaging of the product comprised of two layers. The primary package used was butter paper bag. The outer layer was of a brown paper bag. The packaging was designed in order to reduce plastic waste and even taking into consideration the shelf life, storage and presentation of the product.



Fig: 3
Fig:4
Fig 3 and 4: Front and Back label of the pack

8.2. Labelling

As per the Packaging and Labelling guidelines laid by FSSAI (India) the following details were mentioned on the Food packet:

- Name of the food product
- A lot or batch identification
- Name and address of the manufacturer
- Warning or advisory statements
- Ingredient list
- Best before date
- Manufacturing date
- Directions to use and storage
- Nutritional information
- Net weight or volume
- Veg or non-veg label (16)

9. CONCLUSION

A calcium-rich product was formulated and analyzed. Consumption of calcium can be enhanced by supplementing with foods naturally rich in calcium. The product is concocted with ingredients that render it to supplement calcium through food, thus helping in the replenishment of calcium (27% of Daily Value) in the body. The results from Sensory evaluation suggest that the product was appraised by the sensory panel (Overall acceptance: 7.4). The shelf life of the product is determined to be of four weeks.

10. FUTURE PROSPECTS

As the trend for 'all-natural' and 'functional foods' are on the rise, there has been a shift in the market for foods that are labelled the same. The consumers are considering to rely on natural food sources to obtain their daily required nutrients, moreover an ample amount of population are very repellent to the idea of taking medicines. Taking these aspects into consideration, Multipro Ragi Premix was devised. The product has a scope to be marketed due to its nutritionally dense ingredients, ease of preparation and palatable taste. The product can be improvised by the addition of various other nutraceutical ingredients. The Quality and Bioavailability of the Calcium in the product can be studied further.

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