

Formulation of finger millet cookies & studies on Nutritional and sensory attributes

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Abstract

The study was designed to carried out to formulate calcium and iron enriched cookies .The objective of this research was to prepare the nutritionally enriched cookies developed by incorporating ragi. Chemical composition of finger millet revealed that total carbohydrate content of finger millet has been reported to be 73.3mg/100 gm of product. Finger millet has nearly 6.2mg/100 gm of protein. Total ash content is higher in finger millet than in commonly consumed cereal grains. The ash content has been found to be nearly 1.5mg/100 gm in finger millet. Calcium content of ragi was found to be 320 mg/100g, Finger millet is the richest source of calcium and iron. Iron content was 3.8 ± 0.1 mg/100 gm of ragi. Calcium deficiency leading to bone and teeth disorder, iron deficiency leading to anemia can be overcome by introducing finger millet in our daily diet. The recipe for iron enriched cookies was standardized on the basis of sensory evaluation study .It was observed that cookies prepared with 30% of ragi was highly acceptable. The iron and calcium content was found to be 9.5 ± 0.1 & 152 ± 0.1 mg/100 gm of product. The use of 30% of ragi in the preparation of cookies is useful strategy to optimize the consumption of food rich in functional ingredients.

1. Introduction

Millet sustains one third of the world's population and play a significant part of diet in developing countries, particularly India, where they are eaten by a large section of the poor community [7,3]. Finger millet [*Eleusinecoracana* (L.)] commonly known as ragi is important minor millet widely grown in Africa and Asia. It is originally native to the Ethiopian highlands and was introduced in India a long time ago. Karnataka has the largest area under finger millet and is the biggest producer of ragi in India. Ragi is the main staple food consumed by the majority of the population in South Karnataka (13).

Millets are particularly high in minerals like iron, magnesium, phosphorous and potassium. Finger millet (Ragi) is the richest in calcium content, about 10 times that of Paddy rice or wheat. (12) Calcium and iron are important minerals needed by a human body in order to function properly. Deficiency of calcium can lead to osteopenia, osteoporosis, cramping of muscles, and increase the risk of fractures. Iron deficiency mostly results in anemia. Ragi the hub of health helps in reducing weight. It reduces cholesterol content of the body and reverts skin ageing. It increases bone strength and act as a natural treatment for multiple diseases like anemia, diabetes, brittle bones and osteoporosis. It has excellent nutritional value and is even superior to other common cereals. Despite finger millet's rich nutrient profile, recent studies indicate lower consumption of millets in general by urban Indians. Finger millet is processed by milling, malting, fermentation, popping, and decortication. Noodles, vermicelli, pasta, Indian sweet (halwa) mixes, papads, soups, and bakery products from finger millet are also emerging (14)

The biscuits and cookies industry in India has been growing .at a CAGR of 10% for the last three years, and is currently valued at INR 145bn. India is currently the world's largest biscuit consuming nation .The industry is expected to grow at a CAGR of 14% till FY 2019.(15). Bakery products such as biscuits /cookies have high consumer acceptance and are important for delivering bioactive compounds in to human diet(16) "cookies is chemically leavened products also known as biscuits, they are ideal for nutrient availability, palatability, compactness and convenience. They are in low moisture content as compare to other products and resistant for microbial spoilage and long shelf life product (17). Taking into consideration the need and demand of nutritionally enriched food products the studies have been carried out to

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formulate the cookies enriched with ragi flour to satisfy the calcium and iron requirement growing population.

2. Materials and Methods

The material required were purchased from local market. Ragi ,Maida, Sugar, Butter, Corn starch Milk ,Baking powder.[2,8]The Butter is beaten with powdered sugar. Then the mixture of Maida, ragi flour, cocoa powder, baking powder, corn starch, is added and followed by addition of milk along with chocolate essence. A resting period of 15min at room temperature is given to the prepared dough. Then sheets are formed. It is then moulded and dropped on the baking trays. Then those trays are placed in oven for baking. After baking (140°C for 15min) the trays are taken out, cooled and cookies are packed [2-3,10].

Process flow sheet

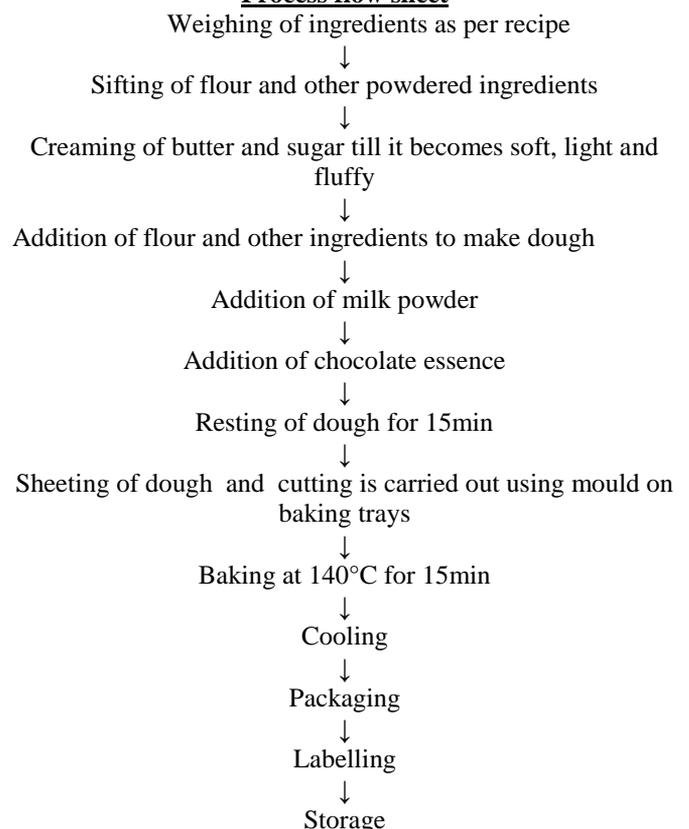


Table 1 : Sensory evaluation[8]

Evaluati on param etres	Appea rance	Col or	Taste	Flav or	Aft er tast e	Text ure	Over all acce ptabi lity
Sampl e 1	7.5±0.65 ^a	8±0.12 ^b	8.5±0.63 ^d	8±0.74 ^b	7.7±0.72 ^a	8.2±1.2 ^b	8.5±0.12 ^d
Sampl e 2	7.5±0.75 ^a	7.4±0.71 ^a	8.0±0.13 ^b	7.8±0.66 ^c	7.3±0.68 ^a	8±0.74 ^b	8.0±0.83 ^b

Sample 1: Cookies with butter

Sample 2: Cookies with margarine

Values are expressed as mean±standard deviation (means values of three replicates).

All mean values with different superscripts in column are significantly different.

The recipe was finalized on the basis of sensory evaluation. The protein content was determined by using Micro-kjeldahl method, fat was estimated using soxtron fat extraction system, carbohydrate was analyzed using anthrone method. Ash content is determined in muffle furnace and moisture content is determined using hot air oven. Iron and calcium content is determined using the std. method mentioned in Rangana.

**Fig. 1:** After baking

3. Results

Table 2: Analysis of Ragi

Test	pr ot ein	Fat	Carboh ydrate	Fi br e	Ash	Moi sture	Iron	Calc ium
Valu e (mg per 100 gm)	6.2±0.15	19.6±0.05	73.3±0.1	3.4±0.15	1.50±0.1	4±0.15	3.8±0.1	320±0.1

Table 3: Analysis of product

Test	prot ein	Fat	Carboh ydrate	Fibre	Ash	Moist ure	Iron	Calc ium
Value (mg per 100 gm)	6.5±0.1	19.6±0.05	76.4±0.1	3.2±0.1	1.50±0.1	4±0.15	9.5±0.1	152±0.1

4. Conclusions

The sensory studies carried out with cookies has been shown that cookies prepared with using butter and 30 % ragi (70:30 maida and ragi) is more acceptable than the margarine cookies. It may be concluded that ragi can be successfully

incorporated in the refined flour up to level of 30% to yield cookies with acceptable sensory attributes. Ragi supplementation significantly improved the Iron and Calcium content of cookies. Hence the development and utilization of ragi will improve the nutritional status of consumer.

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