



Formulation and standardization of muffins incorporated with malted ragi flour

Ranjeet Chunilal Kokani^{1*}, Shabnam Vijay jaiswal²

¹ Principal, College of Food Technology, Saralgaon Tq. Murbad Dist. Thane, Affiliated to Dr. B.S.K.K.V. Dapoli, Maharashtra, India

² Student, College of Food Technology, Saralgaon Tq. Murbad Dist. Thane, Affiliated to Dr. B.S.K.K.V. Dapoli, Maharashtra, India

Abstract

Muffin is one of the most popular bakery products. Generally it is prepared from refined wheat flour and rich source of protein, fat and carbohydrates but limiting in minerals and dietary fibers. Malted Ragi flour is rich in minerals like calcium, iron, phosphorus, fiber and vitamin contents. In the present study the mineral and fiber contents of muffins samples were improved by the use of blends of refined wheat flour and malted Ragi flour (50:50, 60:40;70:30,100:00) with other ingredients. The 70:30 proportions of blend were selected by sensory evaluation. The formulation and standardization of recipe of malted Ragi muffins were carried out successfully. The muffins prepared with 70% malted Ragi flour had highest Nutritional content. Nutritive value of contain product were Ash content 3.0 %, Moisture content 11.3%, Fat content 14.5g/100gm, Protein content 6.5g/100gm, Carbohydrate content 52.5g/100gm, Crude fiber content 4.02%, Calcium content 19.02% and Energy value 366Kcal/100gm respectively. Packaging of the product was carried out in LDPE plastic material and stored at ambient temperature and refrigeration condition. It concluded that product was stored up to 15 days without any variation at ambient temperature and in refrigeration condition up to 28 days remains without variation. The health benefits of malted Ragi are known so the product is having some enrichment than the other marketed products. These are beneficial for growing children, teenagers and pregnant and lactating women due to its high nutritive value.

Keywords: ragi malt, formulation, muffins, nutritive value, storage

Introduction

Muffins are a type of semi –sweet cake or quick bread that is baked in appropriate portion. They are similar to cupcakes, although they are usually less sweet and lack in icing. Savory varieties, such cornbread muffins or cheese muffins also exist. The term also refers to disk- shaped muffin bread, called an English muffin outside the United Kingdom. As American style muffins are also available in common wealth countries, the term muffins either refer to product, with the context usually making clear which is meant. There are many varieties such as low- fat and flavors of muffin mace with a specific ingredient such as blueberries, chocolate chips, raspberry, cinnamon, pumpkin, date, nut, lemon, banana, orange, peach, strawberry, almond, and carrot, baked into the muffin. Muffins are also eaten for breakfast alternatively they may be served for tea or at other meals (English muffin-kitchen dictionary food.com).

Finger millet (*Eleusine coracana*) also known as Ragi, Nachni or Nagli is one of the important millets in India. Finger millet is extensively grown on hilly areas and southern part of India and is widely consumed in the form of dumping by vast section of people. Finger millet is the rich source of Ca (300-350mg %), Phosphorus (283mg %), Fe (3.9%). Finger millet is reported to have anti ulcerative properties and finger millet diets lowered blood glucose cholesterol in diabetic rat models. Ragi flour will provide many health benefits like Ragi for losing weight, bone health, lowering blood cholesterol, for anemia and other health conditions.

Ragi is a staple food for majority of the population in some parts of India and in other developing countries. Ragi usually ranks third in cereal production in semi-arid regions

of the globe, after sorghum and pearl millet. The major Ragi cultivating states in India are Maharashtra and Uttaranchal. It gained a lot of importance in recent years because of its higher contents of calcium, iron and dietary fibre. The calcium content is higher than all cereals and also has good quality protein along with the presence of essential amino acids, vitamin B and phosphorus. Thus, it is a good dietary source of nutrients for growing children, expecting women, elderly people and patients.

Finger millet is usually used for preparation of flour, pudding, porridge and roti. With the change in scenario of utilization of processed products and awareness of the consumers about the health benefits, finger millet has gained importance because of its functional components such as slowly digestible starch and resistant starch. The composite flour of Ragi and wheat appears not only to improve the nutritional quality but promote the health benefits. Ragi is a crop that can withstand severe drought conditions and can be easily grown throughout the year. Nutritionally, when Ragi is used as a whole grain, it is higher in protein and minerals in comparison with all other cereals and millets. It is a remarkable source of protein, making it perfect for vegetarian diets.

In the germination process, both starch and protein are partially degraded, important for better digestibility and some of the flatus factors are also degraded. There is also overall improvement in the flavour profile (Nirmala *et al.*, 2000, Ram *et al.*, 1979; Rao and Belavady, 1978,)^[13]. With the changes in scenario of utilization of processed products and awareness of the consumers about the health benefits, finger millet has gained importance because of its functional components, such as slowly digestible starch and resistant starch (Wadikar *et al.*, 2007)^[3]. Traditionally Ragi is

processed either by malting or fermentation (Rao and Muralikrishna, 2001) [13]. Malting of finger millet improves its digestibility, sensory and nutritional quality as well as pronounced effect in the lowering the antinutrients. Malting characteristics of finger millet are superior to other millets and ranks next to barley malt (Malleshi and Desikachar, 1986 and Pawar and Dhanvijay, 2007) [9, 18]. There are various benefits of malting such as vitamin-C is elaborated, phosphorus availability is increased and lysine and tryptophan are synthesized (Dulby and Tsai, 1976) [19]. The malted and fermented Ragi flour are extensively used in preparation of weaning food, instant mixes, beverages and pharmaceutical products (Rao and Muralikrishna, 2001) [13]. Muffins are the form of food that is usually sweet and often baked. It supplies body building protein, fats and carbohydrates. Muffins is normally prepared with refined wheat flour, sweetening agent (sugar), binding agent, egg, fat and vanaspati, liquid flavour and some form of leavening agent such as yeast or baking powder. In recent years finger millet has received attention and efforts are under way to provide it to consumers in convenient forms (Malleshi and Desikachar, 1986) [9]. In the present study attempts were made to improve the nutritional quality of muffins with respect to the mineral contents and fibre content by supplementing with malted Ragi flour.

Materials and Methods

Procurement of Raw Material

Raw materials required during present investigation were procured from local market of Saralgaon such as Ragi, Maida, Sugar, Milk, Milk powder, Butter, Cardamom powder, Baking powder etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane

Physical Properties of Muffin

The colour and shape of Muffins were determined by visual observations. The weight of Muffin was measured on analytical weighing balance.

Chemical Properties of Muffin

Proximate composition such as moisture, ash, crude fat, crude protein and crude fibre of all the Ingredients and Crackers was determined according to the procedures given in AOAC (2000). For moisture determination samples were dried in oven at 130°C for 60 minutes. For ash determination samples were placed in muffle furnace at 550°C to burn out all carbon compounds leaving in organic part (ash). Fat was determined by fat extraction unit by using Hexane. For fibre determination, samples were treated with 1.25% Sulphuric acid and Sodium Hydroxide solution. After filtration of digested material it was washed with hot water and then ignited. By calculating loss of weight after ignition, crude fibre contents were determined. Protein contents were determined by using Kjeldahls unit.

Sensory Evaluation of Muffin

Prepared product were evaluated for sensory characteristics in terms of appearance, color, flavor, after taste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale.

Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'. The obtained results were recorded in sensory score card.

Statistical Analysis of Muffin

The analysis of variance of the data obtained was done by using completely randomized design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of $p < 0.005$ level S.E and C.D. at 5 percent level is mentioned wherever required.

Formulation of Muffin

Muffin prepared with incorporation varying levels of Malted Ragi and Maida were investigated. The formulation viz., 100:00, 70:30, 60:40 and 50:50 percent and represent as a T0, T1, T2 and T3 respectively. Sample T1 of Muffin was organoleptically acceptable and used for further study.

Formulation of Muffin

Table 1

Ingredients	Treatments			
	T0	T1	T2	T3
Malted Ragi Flour	100	70	60	50
Maida	00	30	40	50

Where,

T0-100g Malted Ragi Flour + 00 g Maida

T1-70 g Malted Ragi Flour + 30g Maida

T2-60 g Malted Ragi Flour + 40g Maida

T3-50 g Malted Ragi Flour + 50g Maida

Preparation of Malted Ragi Muffin

The malting of Ragi was carried out with slight modification in the procedure. In brief the Ragi seeds were washed with water for 5 times and soaked in water for 5 hr. Excess water was drained; seeds were tied in a muslin cloth and kept on it. These seeds were germinated at $27 \pm 3^\circ\text{C}$ for 24hr and dried in shade for 2 days and grinded in electrical grinder.

Preparation of Muffin incorporated with Malted Ragi.

Muffins were prepared by taking appropriate proportions of ingredients with following sequence. The good quality raw material was selected i.e. it was free from foreign particles and microbial load after that Malted Ragi, Refined wheat flour and sugar was sieved for proper dough mixing and achieving proper smooth consistency. Then, one large mixing bowl was taken and in that of sugar and butter was added & mix it well. After that dry mix (refined flour, Malted Ragi flour & cocoa) and wet ingredients (milk) with its appropriate proportions was taken and added these ingredients simultaneously into mixing bowl with proper mixing in fixed direction (clockwise or anticlockwise). After that kneading was done to attain the desired dropping consistency. The Cardamom powder was added, and then the batter was poured into muffins moulds (cupcakes). And finally the muffins were baked in baking oven (which was preheated) at 110oc for 30 to 40 minutes or until gets golden brown colour. After cooling the muffins were weighed and packed in plastic bags and stored in air tight plastic container at ambient room temperature.

Results and discussion

Physical Properties of Malted Ragi Muffin

Colour of muffins incorporated with malted Ragi flour was brown due to present of Ragi flour which was determined by visual Observation. The shape was round cup shape due to use of round sheets of paper. The weight of 1 muffin incorporated with malted Ragi flour was 18gm respectively.

Chemical Properties of Malted Ragi Muffin

Table 2

Parameter	Results	Unit
Energy value	366	Kcal/100 gm.
Protein	6.5	g/100 gm.
Carbohydrates	52.5	g/100 gm.
Fat	14.5	g/100 gm.
Ash	3.0	%
Moisture	11.3	%
Crude fibre	4.02	%
Calcium	19.02	%

It concludes that proximate composition of muffins incorporated with malted Ragi flour were found to be Ash content 3.0 %, Moisture content 11.3%, Fat content 14.5g/100gm, Protein content 6.5g/100gm, Carbohydrate content 52.5g/100gm, Crude fiber content 4.02%, Calcium content 19.02% and Energy value 366Kcal/100gm respectively. It concluded that muffin incorporated with malted Ragi flour rich in Calcium. Calcium determine by Titration Method.

Sensory Evaluation of Malted Ragi Muffin

As evident in sensory evaluation the color score were higher for the sample T1 and T2. The Texture, Colour and Appearance score were higher than T2 and T3 sample. Overall acceptability of T1 sample is more acceptable than sample T2 and T3. Sample T1 satisfy the consumer in accepts and quality.

Table 3

Parameter	T0	T1	T2	T3
Colour	7	8	7	6
Flavour	7	8	7	6
Taste	6	7	7	8
Texture	6	8	8	8
Appearance	6	8	7	7
Overall acceptability	6.4	7.8	7.2	7

Conclusion

It may concluded that the superior quality of muffins incorporated with malted Ragi flour can be prepared by addition of 70% of Malted Ragi flour and 30% Maida as the overall acceptance for treatment combination. T1 was highest in all the parameters as compare to T0, T2 and T3. Nutritional content of muffins incorporated with malted Ragi flour were found to be Ash content 3.0 %, Moisture content 11.3%, Fat content 14.5g/100gm, Protein content 6.5g/100gm, Carbohydrate content 52.5g/100gm, Crude fiber content 4.02%, Calcium content 19.02% and Energy value 366Kcal/100gm respectively. The product can satisfy the consumer in accepts and quality.

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