Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2020; 9(1): 1774-1777
Received: 28-11-2019
Accepted: 30-12-2019

Rathod Maya S
Assistant Professor, College of Food Technology, Paithan road, Aurangabad, Maharashtra, India

Patharkar Swapnil R
Assistant Professor, College of Food Technology, Paithan road, Aurangabad, Maharashtra, India

Rathod Balasaheb M
Assistant Professor, College of Food Technology, Paithan road, Aurangabad, Maharashtra, India

Corresponding Author:
Rathod Maya S
Assistant Professor, College of Food Technology, Paithan road, Aurangabad, Maharashtra, India

Standardization of beet root fortified Ragi biscuits

Rathod Maya S, Patharkar Swapnil R and Rathod Balasaheb M

Abstract
The present investigation was carried out to assess the suitability of different ingredients in development of bakery product and to observe the effect of different ingredients on the sensorial and nutritional properties of prepared food product. The studies were focused on standardizing the concentration of different ingredients to a level of acceptable quality. The popular bakery product was prepared by adding refined wheat flour (200g), fat (250g), sugar (250g), ragi flour (250g) and beetroot powder (50g). The results revealed that the bakery product prepared from composite ingredients was found to be more acceptable with respect to mentioned sensorial quality parameters and incorporation of beetroot and ragi flour in the bakery product increased its nutritional value.

Keywords: Bakery product, ragi flour, beetroot

Introduction
Millets are nutritionally rich and occupy an important place in the diet of people in many regions of the world (R.V. Jaybhaye *et al.* 2014). Millets are considered as crop of food security because of their sustainability in adverse agro-climatic conditions (Ushakumari *et al.*, 2004) [20]. These crops havesubstantive potential in broadening the genetic diversity in the food basket and ensuring improved food and nutrition security (Mal *et al.*, 2010) [13]. Along with nutrition millets offer health benefits in daily diet and help in the management of disorders like diabetes mellitus, obesity, hyperlipidemia, etc. (Veena, 2003) [22]. Millets offer unique advantage for health being rich in micronutrients, particularly minerals and B vitamins as well as nutraceuticals. Ragi grain is exceptionally rich in calcium (300 - 400 mg), which is approximately 10 times more than what is present in most cereals including rice and wheat. It is also a good source of many other micronutrients such as iron, magnesium, zinc, chromium, iodine and thiamine. Because of high mineral contents, the millet food is considered as cool food, and this probably helps in maintaining the acid base balance in the human system. As a result the persons on consumption of millet food withstand dehydration and tolerate thirst better than persons consuming other foods. Millet is a gluten-free and low-cost cereal (approximately 40% lower than the price of corn), which is resistant to drought and nutrient-poor soils (Gomes *et al*., 2008) [4]. In 2011, the global millet production was about 27.5 million tons (Food and Agriculture Organization, 2015.The total annual production of all millets worldwide is approximately 4.5-5 million tons, with India alone producing about 2.5 million tons and some countries in Africa accounting for about 2 million tons of the grains (Mathur, 2012) [14]. India is thus reported to be the largest producer of FM (Wankhede *et al*., 1979; Pandhre *et al*., 2011) [24, 16], contributing a total of 60% of the global production (Gull *et al*., 2014) [6]. High blood pressure (BP) or hypertension (BP of >140/90 mmHg) is a major public health burden. Worldwide, in 2001, 13·5% of all premature deaths were attributed to high BP (Lawes 2008) [10]. Moreover, hypertension is a major risk factor for the progression of CVD (Lewington, S *et al*. 2002, Mac Mahon, S *et al*. 1990, Vasan R S *et al*. 2001) [11, 12, 21]
Increased fruit and vegetable consumption protects against CVD and hypertension (Appel *et al*. 1997, Zhang X *et al*. (2011) [3, 26]. These cardioprotective effects have previously been attributed to several different nutrients found in vegetables such as antioxidant vitamins and flavonoids. However, clinical trials fail to ascertain the beneficial effects (Vivekananthan *et al*. 2003, Habauzit, V & Morand, C 2011) [23, 8]. In addition, beetroot is particularly rich in betalains, a group of nitrogen-containing colour compounds that are not commonly represented among edible plants. Betalains can be divided into two subclasses: the red/purple betacyanins which are responsible for the colour of red beetroot or the yellow/orange betaxanthins that contribute to the colour of yellow beetroot. White beetroot is deficient in betacyanins, but no other differences between beetroot varieties have been reported in the literature. Betalains have been shown to act as antioxidants, by the donation of electrons

(Wettasinghe, M, *et al*. 2002 Kanner J 2001) [25], and inhibit lipid peroxidation and haem decomposition *in vitro* (Kanner J 2001), suggesting a role of these compounds in protection against certain oxidative stress-related diseases, such as hypertension and CVD.

Materials and Methods

The present investigation was carried out in Department of Food Science and Technology, College of Food Technology, VNMKV, Parbhani. The ingredients such as refined wheat flour ragi flour fat sugar beetroot baking soda etc. were purchased from local market of Parbhani. Chemicals used in this investigation were of analytical grade. The beetroot powder was prepared by using convective heat dryer at 55 ˚C and grinding by mixer grinder (Sheetal G *et al*. 2013) [19].

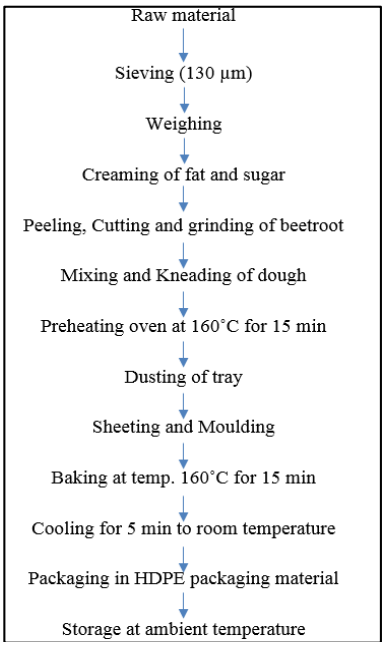
Composite flour formulation for preparation of extruded snack

The Control flour was prepared by using refined wheat flour (200g), fat (250g), sugar (250g), ragi flour (250g) as standard (Guria, 2006) [7]. For the levels of ragi and beetroot powder, different preliminary trials were carried out followed by informal sensorial evaluation of product to optimize the maximum suitable concentration of ragi and beetroot incorporation. It was observed that if the concentration of ragi flour incorporation is reduced beyond 50 per cent then the overall quality of prepared product is being drastically reduced as product is becoming brittle while minimum concentration of ragi flour required to prepare product should be 10 per cent otherwise the product is becoming hard. Hence, on the basis on preliminary trials, the recipes were finalized for experimentation from Table-1.

Table 1: Different proportions of ingredients used for standardization

Ingredients	T0	T1	T2	T3	T4
Refined wheat flour	100	30	40	60	70
Ragi flour	0	70	60	40	30
Beetroot powder	0	10	10	10	10

Method of Preparation of Biscuits



Flow sheet 1: Process for preparation of ragi and beetroot incorporated biscuit

Nutritional analysis

Nutritional analysis for moisture content, crude protein content, crude fat, ash were determined by standard procedure given by AOAC (2002) [2], while total carbohydrate was determined by standard procedure using phenol and sulphuric acid AOAC (1990) [1].

Sensory evaluation of product

The sensory assessments was carried out by panel of 25 members consisted of staff and post graduate students of the College of Food Technology, VNMKV, Parbhani. Sensorial evaluation was done by using 9-point hedonic scale (Meilgaard, *et al*. 1999) [15].

Results and Discussion

The present investigation entitled was carried to explore the possibilities of enhancing the nutritional value of product using ragi flour and beetroot powder and to observe its effect on sensory and nutritional properties. The results obtained during present investigation are presented under different suitable headings.

Proximate composition of beetroot incorporated biscuit product ingredients

Proximate composition generally represents the nutritional quality of different flours. It is necessary to observe the proximate composition of various flours to be used in beetroot incorporated biscuits preparation to judge its effect on final product quality. The proximate composition of major ingredients viz. refined wheat flour, ragi flour is represented in Table-2.

Table 2: Chemical properties of Beet root fortified ragi biscuits

Sample	Moisture (%)	Fat (%)	Protein (%)	Ash (%)	Crude fibre (%)	Carbohydrates (%)
T_c	1.51	22.76	5.40	0.80	0.42	69.02
T_1	1.65	21.66	5.90	0.88	0.48	69.33
T_2	1.80	20.34	6.63	1.05	0.56	69.62
T_3	2.01	19.42	7.02	1.12	0.68	69.57
T_4	2.36	18.34	7.65	1.24	0.80	69.59
Mean	1.86	20.54	6.50	1.01	0.59	69.38

* Each value represents the average of ten determinations

Table 3: Nutritional information of refined wheat flour per 100g

Sr. no.	Nutrients	Amount
1	Fat	1.3 g
2	Carbohydrates	44.33 g
3	Total sugar	1.5 g
4	Protein	9.4 g
5	Vitamin	0.3 g
6	Thiamine	0.10 g

Table 4: Nutritional information of ragi flour per 100g

Sr. no.	Nutrients	Amount
1	Fat	1.3 g
2	Carbohydrates	75 g
3	Total sugar	1.7g
4	Protein	7.3 g
5	Minerals	2.7 g
6	Calcium	344 mg

It can be clearly seen from Table-2 AND Table-3 that the great variation exists in various constituents among the flours to be used in making the beetroot incorporated biscuits. With

respect to protein, the protein content of ragi flour, refined wheat flour was found to be 9.4and 7.3% respectively.

The results pertaining to protein content revealed that incorporation of ragi may increase overall protein of ragi and beetroot incorporated biscuits product. The results with respect to the composition of soybean flour are comparable with the earlier reported values (Pollock and Geddes, 1960) [17].

Spread ratio determination Three rows of five well formed biscuits were made and the height measured. The biscuits were arranged horizontally edge to edge and the sum of the diameter measured with the height. The spread ratio (Gomeaz *et al*., 1997) [5] was calculated as diameter/height.

Physical properties of Beet Root Fortified Ragi Biscuits

Table 5: Physical Properties of Beet Root Fortified Ragi Biscuits

Treatment	Weight (g)	Diameter (mm)	Thickness (mm)	Spread ratio
T_c	6.88	40.93	4.15	9.86
T_1	7.01	41.01	4.76	8.61
T_2	6.90	40.38	4.21	9.5
T_3	6.59	40.59	4.56	8.9
T_4	7.13	41.03	4.83	8.49
Mean	6.90	40.78	4.52	9.07

Sensory evaluation of extruded products

The panel of semi-trained judges consisting of 25 members was given the extruded snack food samples for evaluation of organoleptic characteristics *viz*. color, taste, flavor, texture and overall acceptability. It was served to judges on the day of preparation. The average sensorial score recorded by judges on hedonic scale was depicted in Table-4 and discussed under suitable quality attributes.

Table 6: Sensory evaluation of ragi and beetroot incorporated biscuits product

Sample	T0	T1	T2	T3	T4
Appearance	9	6	8	8	9
Texture	9	8	9	9	7
Taste	8	7	7	9	8
Mouth feel	8	8	8	8	7
After taste	9	8	7	8	8
Overall acceptability	8.6	7	7.8	8.4	7.8

Conclusion

Ragi has the highest amount of calcium (344 mg/100 g) and potassium (480mg/100g). It has higher dietary fibers, antioxidants properties, phytochemicals, mineral and Sulphur containing amino acid. Beetroot is rich source of betalains (a phytochemicals and antioxidant), calcium, magnesium, copper, phosphorus, sodium and iron. Because of betalains it is used as natural colorant. These two ingredients are sources of many nutrients but are consumed at very low quantity, so we have used them in biscuits, popular bakery product. After standardizing the recipe, the final composition of product is selected on the basis of sensory score. The product was having good nutritional value and sensory attributes. This product is economically feasible.

References

1. AOAC. Official method of analysis Volume II, Association of Official Chemists, Washington, 1990.
2. AOAC. Official Methods of Analysis of AOAC International, 16th ed., 5th rev. Method 930.15. The Association, Gaithersburg, MD doi, 2002.
3. Appel LJ, Moore TJ, Obarzanek E *et al*. A clinical trial of the effects of dietary patterns on blood pressure. N Engl J Med. 1997; 336:1117-1124.
4. Gomes PC, Rodrigues MP, Albino LFT, Rostagno HS, Gomes MFM, Mello HHC *et al*. Determinaçao da composicao quimica e energetica do milheto e sua utilizaçao em rações para frangos de corte de 1 a 21 dias de idade. Revista Brasileira de Zootecnia, 2008; 37(9):1617-1621.
5. Gomeaz MI, Obilantan AB, Martin D, Madvamase T, Manyo ES. Grain quality evaluation in manual of lab procedure for quality evaluation of sorghum and pearl millet tech. manual No. 2. International crop research institute for the semi arid crops (ICRISAT). Ihekoronye, A. I. and Ngoddy, P. O., 1985-1997.
6. Gull A, Jan R, Nayik GA, Prasad K, Kumar P. Significance of finger millet in nutrition, health and value added products: a review. Journal of Environmental Science, Computer Science and Engineering and Technology. 2014; 3(3):1601-1608.
7. Guria P. Physico-chemical properties, nutritional Quality and value addition to quality Protein maize (*Zea Mays* L.). M. Sc. Thesis. Department of Food Science and Nutrition, College of Rural Home Science. University of Agricultural Sciences, Dharwad, 2006.
8. Habauzit V, Morand C. Evidence for a protective effect of polyphenols-containing foods on cardiovascular health: an update for clinicians. Ther Adv Chonic Dis (epublication ahead of print 5 December 2011), 2011.
9. Halvorsen BL, Holte K, Myhrstad MCW *et al*. A systematic screening of total antioxidants in dietary plants. J Nutr. 2002; 132:461-471.
10. Lawes CMM, Hoorn SV, Rodgers A. Global burden of blood-pressure-related disease, 2001. Lancet. 2008; 371:1513-1518.
11. Lewington S, Clarke R, Qizilbash N *et al*. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. Lancet. 2002; 360:1903-1913
12. MacMahon S, Peto R, Collins R *et al*. Blood pressure, stroke, and coronary heart disease: part 1, prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias. Lancet. 1990; 335:765-774
13. Mal B, Padulosi S, Ravi SB. Minor Millets in South Asia: Learnings from IFAD-NUS Project in India and Nepal. Maccarese, Rome, Italy: Bioversity Intl., and Chennai, India: M.S. Swaminathan Research Foundation, 2010, 1-185.
14. Mathur PN. Global strategy for the ex situ conservation of finger millet and its wild relatives (pp. 1-62). New Delhi, India: Biodiversity International, Sub-regional Office for South Asia, NASC Complex, Pusa Campus. Retrieved from, 2012 https://www.croptrust.org/wp-content/ uploads/2014/12/Finger-Millet-Strategy-FINAL-14May2012.pdf.
15. Meilgaard M, Civille GV, Carr BT. Sensory Evaluation Techniques. 3rd Ed. USA: CRC Press LLC, 1999
16. Pandhre GR, Satwase AN, Hashmi AI. Studies on drying characteristics and nutritional composition of sprouted wheat and finger millet. International Journal of Current Research. 2011; 3(7):218-221.

17. Pollock JM, Geddes WF. Soya flour as white ingredients, 4180 Scientific Journal Series, Minnesota agricultural experiment station the Procter and Gamble Co., Cincinnati, Ohio, 1960.
18. Shahidi F, Chandrasekara A. Millet grain phenolics and their role in diseases risk reduction and health promotion – review. Journal of Functional Foods. 2013; 5(2):570-581.
19. Sheetal Gupta, Gowri BS, Jyothi Lakshmi A, Jamuna Prakash. Retention of nutrients in green leafy vegetables on dehydration J Food Sci Technol (September–October 2013) 2013; 50(5):918-925.
20. Ushakumari SR, Shrikantan L, Malleshi NG. The functional properties of popped, flaked,extruded and roller dried foxtail millet (*Setaria italica*). International Journal of Food Science and Technology. 2004; 39:907-915.
21. Vasan RS, Larson MG, Leip EP *et al*. Impact of high-normal blood pressure on the risk of cardiovascular disease. N Engl J Med. 2001; 345:1291-1297.
22. Veena B. Nutritional, functional and utilization studies on barnyard millet. M. Sc. Thesis, University of Agricultural Sciences, Dharwad (Karnataka), India, 2003.
23. Vivekananthan DP, Penn MS, Sapp SK *et al*. Use of antioxidant vitamins for the prevention of cardiovascular disease: meta-analysis of randomised trials. Lancet. 2003; 361:2017-2023.
24. Wankhede DB, Shehnaj A, Raghavendra Rao MR. Carbohydrate composition of finger millet (Eleusine coracana) and foxtail millet (*Setaria italica*). Plant Foods for Human Nutrition (Dordrecht, Netherlands), 1979; 4(4):293-303. http://dx.doi.org/10.1007/ BF01095511.
25. Wettasinghe M, Bolling B, Plhak L *et al*. Phase II enzyme-inducing and antioxidant activities of beetroot (*Beta vulgaris* L.) extracts from phenotypes of different pigmentation. J Agric Food Chem. 2002; 50:6704-6709.
26. Zhang X, Shu XO, Xiang YB *et al*. Cruciferous vegetable consumption is associated with a reduced risk of total and cardiovascular disease mortality. Am J Clin Nutr. 2011; 94:240-246.