Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(6): 213-216
Received: 21-09-2019
Accepted: 25-10-2019

Shweta Verma
Department of Food Science and Technology, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India

Sunita Mishra
Department of Food Science and Technology, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India

Corresponding Author:
Shweta Verma
Department of Food Science and Technology, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India

Organoleptic properties and acceptability of ragi flour to prepare noodles

Shweta Verma and Sunita Mishra

Abstract
This study represents the effect of Ragi flour on a nutritional and organoleptic characteristic of noodles. Ragi flour variety VL-149 was taken. The noodles were prepared using Ragi flour and refined wheat flour (RWF) mixed in various amounts (30 - 50%). The control contained refined wheat flour (RWF) noodles. The Ragi flour noodles were evaluated by the sensory quality and nutrient composition. By the sensory evaluation, noticed that the noodles with 30% Ragi flour were gained higher score (8.7) than other compositions. Nutrient value of noodles with 50% Ragi flour indicated that it have maximum amount of basic fat (1.16%), ash (1.39%), fiber (1.30%), carbohydrate (79.45%), energy (350.40 kcal), insoluble dietary fiber (5.49%), soluble dietary fiber (3.69%), iron (5.60%) and calcium (88.40%). However, the highest amount of starch (64.15%), amylose (8.8%) and amylopectin (55.14%) were found in the control noodles. The noodles with 30% of Ragi flour have a significantly lower glycemic index (44.79) than control noodles (63.59). The above results revealed that noodles prepared with 30% Ragi flour enriched in nutrition value and have hypoglycaemic effect.

Keywords: Ragi flour, noodles, refined wheat flour, sensory evaluation

Introduction
Different kinds of traditional food are made to full fill the essential diet for rural and urban homes in India made from small millet grains. One of them is Noodles which are widely consumed throughout the world and it is a fast growing sector because noodles are easy to cook, low cost and have a relatively long shelf-life [1]. The consumption of noodles are increased among the world due to its nutritional properties. The noodles also can be made from ragi flour, rice flour, buckwheat, and starches derived from potato, sweet potato, and pulses. Refined wheat flour, water and salt are the major ingredients required for noodles preparation while the addition of other minor ingredients is required to enhance other properties. Commercially, refined wheat flour noodles are convenient and tasty food products that are rich in carbohydrates but are deficient in essential nutrients such as proteins/essential amino acid, dietary fibers, minerals and vitamins. Many technologies have been developed to enhanced utility and commercial values of these grains [1]. However, the nutritional value of noodles can be enriched using nutritional components that are rich in protein and other nutrients. Ragi (*Eleusine coracana*) in the most useful food which is enriched in protein, fibre, minerals viz. iron, calcium, phosphorus, and vitamin content [2]. However, India contributes nearly 60% of the global production of Ragi flour. It is better grown in the more rainfall areas particularly in acid soil and matures in 100 to 140 days. It can be adjusted in different agro-climatic conditions. Ragi flour is mostly cultivated in the state of Andhra Pradesh, Tamil Nadu [3]. In India, a small segment of peoples consumes Ragi flour in the form of roti. To become healthy, people need a balanced diet having high protein and low fat. However noodles from Ragi flour can provide such type of nutrients. This study represents the preparation and characterization of Ragi flour incorporated noodles. In recent years, the importance of Ragi flour has grown rapidly, due to its nutritive enrich kind as functional fiber, starch, iron and calcium contents. The iron and calcium contents vary from 3-20% and 220-450 in Ragi flour, respectively [4].

Objective
1. To study the nutritional value of ragi flour noodles
2. To study the acceptability of ragi flour noodles

Materials and Methods
Among various varieties, the popular variety of Ragi (Paspalum scrobiculatum) flour VL-149 and refined wheat flour (Triticum aestivum) was procured from the local market in Lucknow, Uttar Pradesh, India.

Preparation of noodles with Ragi and refined wheat flour

Ragi flour was mixed with refined wheat flour. Four types of mixtures in various proportions were prepared using Ragi flour and refined wheat flour. These flour combinations are given in Table 1. Then mixture passed through multiple sieves to obtain a fine powder for noodles. Then kneaded the mixer by the hands followed by addition of water in a proper amount. Then mixture was filled in noodles making machine compartment and extruded through suitable die and cut in desired sizes. Extruded noodles were steamed for 5-10 min at 103-105 ^{0}C then allow at room temperature for 8 hrs. Dried noodles were packed.

Table 1: Compositions of refined wheat flour (RWF) and Ragi flour of noodle samples

Sample Code	RWF (%)	Ragi Flour (%)
Control	100	0
N1	70	30
N2	60	40
N3	50	50

These combinations were evaluated for various nutrition and sensory quality factors.

Ingredients nutritional quality evaluation: Nutritional quality of Ragi flour and refined wheat flour was examined for nutrient configuration. AOAC used to determine basic protein of FMF and RWF [5]. Landry and Mourex method were used to estimate the protein parts of the samples such as albumin, globulin, prolamin, and glutelin. Asp and Josanson method was used to determine the total dietary fiber [6]. Starch was determined with the help of Cerning and Guilbot and Clegg [7, 8]. Thayumanavan and Sadasivum method were used to estimate the amylose and amylopectin [9]. Iron and calcium were estimated using the approach of Raghuramulu [10].

Sensory quality evaluation of noodles: Sensory quality characteristics were assessed for noodles with Ragi. The liking or disliking of the noodles was tested using the 'Nine Point Hedonic scale' method. The acceptability of the noodles was evaluated using the 'Score Card Method.' The sensory assessment was assessed by a panel of members using Amerine method [11].

Nutritive value evaluation of noodles: Nutritional quality of noodles with Ragi and refined wheat flour was examined for nutrient configuration. AOAC used to determine proximate composition (protein, moisture, fat, crude fiber and ash of FMFIN and RWFIN. Landry and Mourex method was used to estimate the protein fractions of the samples such as albumin, globulin, prolamin, and glutelin. Asp and Josanson method was used to determine the total dietary fiber. Starch was determined with the help of Cerning and Guilbo and Clegg. Thayumanavan and Sadasivum method were used to estimate the amylose and amylopectin. Iron and calcium were calculated using the approach of Raghuramulu.

Statistical analysis

Mean value and standard deviation (SD) values are used to tabulate the result. The method of Snedecor and Cochran was used to examine all the data [12]. The calculation has been done by using the mean of three replicates.

Results and Discussion

Nutritional values of raw material

The composition of Ragi flour and refined wheat flour has been shown in Table 2. Ragi flour has 6.45% crude protein. Joshi and Katoch stated 7.1% protein in the Ragi [13]. The protein for refined wheat flour is about to 8.54%. Refined wheat flour and Ragi flour has a significant difference in protein content. The soluble and insoluble dietary fiber content of Ragi flour was 5.40 and 7.01%, respectively (Table 2). Refined wheat flour has 2.01 and 4.10% soluble and insoluble dietary fiber, respectively which is significantly lesser than the Ragi flour. Ragi flour and refined wheat flour has 11.91% and 5.98% total dietary fiber (TDF) respectively.

From the last few years, it is observed that starchy foods play a role in the risk of diabetes [14]. The starch in the Ragi flour was 62.2% (Table 2). Refined wheat flour showed a starch content of 67.9% which was dissimilar from Ragi flour. Amylose content of Ragi flour was 10.53% which was considerably lower than the refined wheat flour (15.14%). The thermal and pasting properties of starch that control the quality of product shelf life and final products are determined by amylose content, amylose-to-amylopectin ratio. Noodles with higher amylose flour have higher gumminess, chewiness, and hardness. Ragi flour has higher iron content (9.10%) than refined wheat flour (4.31%). The calcium content of Ragi flour was about to ten times higher (182.15 mg/100 g) (Table 2) than refined wheat flour (19.16 mg/100 g). Protein fractions analysis of flours showed that globulin, albumin, glutelin, and prolamine for Ragi flour were 14.18, 14.0, 11.0, and 21.10%, and refined wheat flour have 3.45, 14.9, 15.21, and 31.94%, respectively.

Nutritional proximate analysis

Table 2: Nutrient value of Ragi Flour and RWF

Parameters	Ragi Flour (VL-149)	RWF	SD	CD at 5%
Protein (%)	6.45	8.54	0.24	0.24
T. D. F. (%)	11.91	5.98	0.27	1.10
S. D. F. (%)	5.40	2.01	0.14	0.54
I. D. F. (%)	7.01	4.10	0.15	0.62
Starch (%)	62.2	67.9	0.82	3.19
Amylose (%)	10.53	15.14	0.55	2.20
Amylopectin (%)	51.21	53.91	0.26	1.02
Iron (mg/100) g)	9.10	4.31	0.02	0.13
Calcium (mg/100 g)	182.15	19.16	0.07	0.26
Albumin (%)	14.0	14.9	0.10	0.45
Globulin (%)	14.18	3.45	0.12	0.44
Prolamine (%)	21.10	31.94	0.18	0.74
Glutelin (%)	11.0	15.21	0.35	1.36
Residual Protein	40.89	35.51	0.46	1.84

***Source*:** Regional Food Research and Analysis (RFRAC), Lucknow, India

Noodles evaluation for nutritional quality

Table 3 shows the nutritional value of noodles. It has been observed that the noodles with 30% Ragi flour have a lower quantity of fat (1.13%), ash (1.04%), fiber (0.9%), carbohydrate (77.40%), energy (347.95 kcal), IDF (3.45%), SDF (3.07%), TDF (6.47%), iron (3.9%) and calcium (58.85%) than noodles with 40 and 50% Ragi. However, refined wheat flour noodles have more moisture (14.25%), protein (8.78%), starch (64.15%), amylose (8.8%) and amylopectin (55.14%).

Table 3: Nutrient value of noodles Noodles with Ragi flour

	Control (100:0)	N1-30% Ragi Flour (70:30)	N2-40% Ragi Flour (60:40)	N3-50% Ragi Flour (50:50)	SD	CD at 5%
Moisture (%)	14.25	13.15	12.7	12.12	0.59	0.19
Ash (%)	0.73	1.04	1.21	1.42	0.22	0.09
Fat (%)	0.79	1.13	1.1	1.15	0.07	0.23
Protein (%)	8.78	8.67	7.75	6.95	0.24	0.77
Crude fiber (%)	0.26	0.90	1.5	1.25	0.03	0.1
Carbohydrate (%)	77.2	77.4	77.10	78.83	0.32	1.02
Physiological energy (kcal/100 g)	344.51	347.95	351.8	351.49	0.69	2.2
TDF (%)	4.8	6.47	7.43	9.12	0.05	0.14
SDF (%)	1.78	3.07	3.33	3.72	0.03	0.1
IDF (%)	2.89	3.45	4.13	5 .45	0.03	0.09
Starch (%)	64.15	61.4	58.25	56.72	0.36	1.16
Amylose (%)	8.8	7.78	6.21	5.23	0.18	0.59
Amylopectin (%)	55.14	53.12	51.93	51.97	0.36	1.15
Iron (mg/100 g)	2.8	3.9	5.16	5.53	0.02	0.05
Calcium(mg/100 g)	14.41	58.85	72.98 04	88.33	0.03	0.1
Albumin (%)	14.19	13.95	13.7	12.97	0.13	0.39
Globulin (%)	2.71	5.85	7.10	7.83	0.13	0.39
Prolamine (%)	31.29	28.48	27.15	26.14	0.12	0.37
Glutelin (%)	14.27	13.5	12.16	11.64	0.08	0.26
Residual protein (%)	38.48	39.98	41.8	41.97	0.17	0.55

Source: Regional Food Research and Analysis (RFRAC), Lucknow, India

From Table 3, it is observed that the control noodles have a maximum amount of prolamine (31.29%), albumin (14.19%), and glutelin (14.27%). The highest amount of globulin (7.83%) occurred in the noodles with 50% Ragi.

Sensory quality of noodles

Form the results of sensory evaluation of noodles with Ragi flour observed that noodles with 30% Ragi flour was mostly liked and gained 8.70 on the 9 points Hedonic scale which is approximately same as control noodles (8.6). Sensory evaluation by scorecard method revealed that noodles with 30% Ragi flour gained more score for color, appearance, flavor, test, texture, after test and overall acceptability than noodles with 40 and 50% Ragi flour. The meaningless difference was found between noodles with 30% Ragi flour sand control noodles about color, flavor, test, texture, etc. (Table 4).

Table 4: Sensory evaluation of noodles

Noodles	Colour	Appearance	Flavour	Taste	Texture	After Taste	Overall Acceptability
Control	8.5	8.8	8.3	8.5	8.6	8.6	8.6
N1-30% Ragi Flour	8.3	8.5	8.4	8.9	9.0	8.8	8.7
N2-40% Ragi flour	7.4	7.3	6.8	7.3	7.3	7.2	7.2
N2-50% Ragi flour	6.7	6.9	6.4	6.3	6.3	6.1	6.5
Standard Deviation	0.15	0.16	0.2	0.23	0.23	0.25	0.23
CD at 5%	0.43	0.48	0.58	0.66	0.66	0.37	0.67

Source: Regional Food Research and Analysis (RFRAC), Lucknow, India

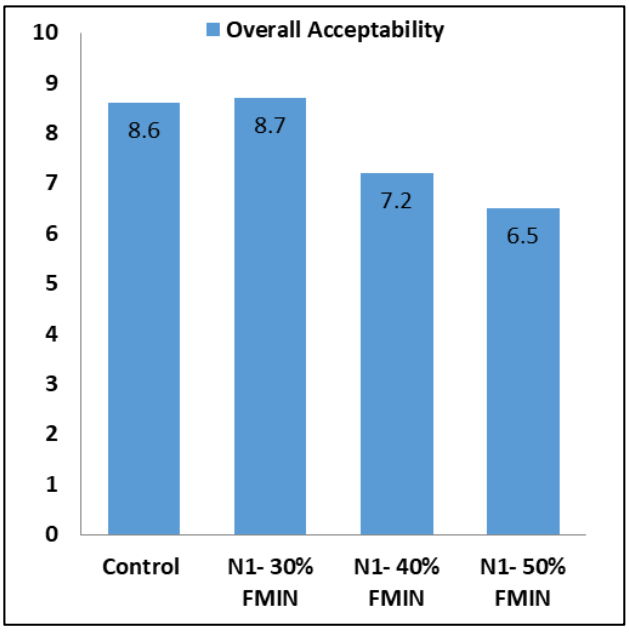

Fig 1: Overall acceptability of Noodles with Ragi Flour

Figure 1 shows that the noodles with 30% Ragi flour gained higher overall acceptability than other compositions.

Conclusion

Form the result of nutritional proximity analysis and sensory evaluation; it has been observed that the noodles with 30% Ragi flour are nutritive enrich and most acceptable by panel members with overall acceptability [8, 7]. Noodles prepared with 30% Ragi flour also enriched in terms of calcium and iron (58.85 and 3.9 mg/100 g). Thus, this nutrient rich noodle will be a good source of food for children, teenagers, sport persons, pregnant and lactating women.

Acknowledgement

I would like to thank the all supporting staff of Regional Food Research and Analysis (RFRAC), Lucknow, India for their contribution during my tests and helped me get results of better quality.

References

1. Kulkarni SS, Desai AD, Ranveer RC, Sahoo AK. Development of nutrient rich noodles by supplementation

with malted ragi flour. International Food Research Journal. 2012, 19(1):309-313.
2. Kudake DC, Pawar AV, Muley AB, Parate VR, Talib MI. Enrichment of wheat flour noodles with oat flour: Effect on physical, nutritional, antioxidant and sensory properties. International Journal of Current microbiology and Applied Science. 2017, 6(12):204-213.
3. Vijayakumar TP, Mohankumar JB. Formulation and Characterization of Millet Flour Blend Incorporated Composite Flour. International Journal of Agriculture Sciences. 2009; 1:46-54.
4. Aykroyd WR, Gopalan C, Balasubramanian SC. The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets. Spec Rep Ser Indian Counc Med Res. 1963; 42:1-255.
5. Balakrishna RK, Mithyantha MS, Devi LS, Perur NG. Nutrient Composition of Some New Ragi Varieties. Journal of Agricultural Science and Chemistry. 1973; 7:562-565.
6. Horwitz W, Chichilo P, Reynolds H. Official methods of analysis of the Association of Official Analytical Chemists. Official methods of analysis of the Association of Official Analytical Chemists, 1970.
7. Asp NG, Johansson CG. Techniques for Measuring Dietary Fiber. Principal aims of Methods and a Comparison of Results Obtained by Different Techniques. The analysis of dietary fiber in food. 1981; 3:173-179.
8. Cerning J, Guilbot A. Changes in the carbohydrate composition during development and maturation of the wheat and barley kernel. Cereal Chemistry. 1973; 50:220-232.
9. Clegg KM. The Application of the Anthrone Reagent to the Estimation of Starch in Cereals. Journal of the Science of Food and Agriculture. 1956; 7:40-44.
10. Thayumanavan B, Sadasivam S. Physicohemical Basis for the Preferential Uses of Certain Rice Varieties. Plant Food Hum Nutr. 1984; 34(4):253-259.
11. Raghuramulu N, Madhavan Nair K, Kalyanasundaram S. National Institute of Nutrition (India). A Manual of Laboratory Techniques. Hyderabad: National Institute of Nutrition, 2003.
12. Amerine MA, Pangborn RM, Roessler EB. Principles of Sensory Evaluation of Food. Elsevier. 2013; 494-518.
13. Snedecor GW, Cochran WG. Statistical Methods. Oxford and IBH publishing company New Delhi, 1983.
14. Joshi HC, Katoch KK. Nutritive Value of Millets: A Comparison with Cereals and Pseudocereals. Himalayan Res Dev. 1990; 9:26-28.
15. Wolever TM. Relationship between Dietary Fiber Content and Composition in Foods and the Glycemic Index. Am J Clin Nutr. 1990; 51(1):72-75.