



PROXIMATE COMPOSITION AND ORGANOLEPTIC QUALITY OF LITTLE MILLET AND RICE CHAKLI

Hoitinkim Singson Nirmala Yenagi

*Department of Home Science, Handique Girls College, Guwahati, Assam, India.

**Department of Food Science and Nutrition, College of Rural home Sciences, University of Agricultural Sciences, Dharwad, Karnataka, India.

Abstract

Little millet is a locally accepted cereal of Northern Karnataka. In the present day there is not much positive response from the farmer to grow and consume this staple cereal as rice is replaced under Public distribution system. Value addition is one of the strategies for commercial exploitation of little millet in diverse form. Fried snacks are convenient foods which occupy a major share in the national and international market. In the present study, the optimized recipe of chakli prepared from little millet was evaluated for nutritional and sensory attribute and compared with traditional rice chakli. The results of the nutrient composition of little millet chakli revealed that the nutrient content of millet chakli was significantly higher than that of rice chakli. The sensory score were also within the acceptable range.

Introduction

Minor millets are nutritionally superior to rice and wheat, as they provide protein, minerals and vitamins and contain higher proportion of dietary fibre (Balasubramanian and Viswanathan, 2010). While attempts are being made worldwide towards achieving self-sufficiency in food, conserving the environment and solving health problem, millet has gained attention as an important crop to overcome food crisis as a nutritious grain and as most millet cultivars can grow in poor soils, under semi-arid conditions. The health benefits of millets include lower plasma cholesterol, reduced glycemic index, high dietary fibre and availability of trace minerals. Even though the nutritional qualities of millet have been well recorded (Hulse et al., 1980), its utilization for food is confined to the traditional consumers in tribal populations, mainly due to non-availability of consumer friendly, ready-to-use milled or polished grains or ready-to-eat products as are widely found for rice and wheat. In recent years, millets have received attention, mainly because of their high fibre and protein contents and efforts are under way to provide it to consumers in convenient forms (Deshpande and Poshadri, 2011). The majority of people in India are economically poor and thus, food choices for balanced diet are further restricted by poverty and insufficient supply of nutritious foods. Therefore, it becomes important to focus on promoting maximal use of locally available inexpensive foods that can offer better nutrition (Anu et al., 2008).

“Chakli” is one of the most popular savoury item in India because of its typical and crunchy taste common to a variety of fried snacks that can be made using different combination of ingredients. The main ingredient for all types of “chakli” is rice flour. “Chakli” are delicious savouries that are generally made at home and kept in airtight containers for eating as fancied and enjoyable with crunchy snack satisfaction (Masshoud, 2011).

In this study, Chakli, because of its popularity is chosen for value addition by replacing the traditionally main ingredient “rice” with “little millet”. The nutritional quality of little millet chakli and its sensory attribute had been evaluated and compared with rice chakli.

Material and Methods

Preparation of rice and Millet chakli

Little millet grains were thoroughly washed with water and dried at room temperature, roasted at 100 ± 5 °C for 4 minutes and ground to fine flour and puffed bengal gram was ground and mixed at the ratio of 1:0.5 to make the chakli flour mix. To a 50 g of the flour mix, 2.5 g heated oil was used as a shortening, 1.2 g of salt and 0.75g ajwain and a pinch of asafoetida was mixed to the dry flour by manual rubbing and then formed into dough using water to make a soft dough. The dough was then put into the chakli press and extruded out in a butter paper which was later immersed into hot sunflower oil of 160°C for 5 minutes respectively, and then the excess oil of the product was drained off in a blotting tissue paper.

For rice chakli, the little millet flour was replaced with rice which was also washed, dried, roasted at 100 ± 5 °C for 4 minutes and ground to fine flour. And then, the similar treatment and procedure was followed as that of millet chakli.

Physical evaluation of prepared chakli and chakli flour

The volume and density of prepared chakli was also measured as per the procedure of Ravi et al., 2011. by sand displacement methods where known weight of sample was placed in a 100 ml measuring cylinder and filled with sand. The difference in volume was calculated and expressed in g/cm^3 as density. [Density (g/cm^3)= Weight (g)/ Volume (cm^3)]. The water and oil



absorption capacity were measured following the methods described by Rosario and Flores(1981). The particle size of the flour mix was analysed with a British standard sieve ranging from 100 mesh to 300 mesh from 100g flour mix without spice

Proximate Composition of Rice and Millet *chakli*

The *chakli* was analysed for proximate composition viz. moisture, ash, crude fat, crude protein, crude fibre using standard AOAC procedure (1990) and carbohydrate method as described by Raghuramuluet al., 1983. All analysis was done in triplicate and the average was reported.

The calorific value was calculated by summing up the values obtained by multiplying with Atwater constants. The values of carbohydrate, crude protein, and crude fat were multiplied with 4, 4 and 9, respectively and expressed as Kcal 100 g⁻¹.

Organoleptic Evaluation

Organoleptic evaluation was carried out using a 9 point hedonic scale with 10 trained panelists from the Department of Food Science and Nutrition, Rural Home Science College, UAS, Dharwad.

Result and Discussion

Physical Characteristics of *Chakli* Prepared From Rice and Little Millet

The volume of the little millet *chakli* (6.33 %) was lower than rice *chakli* (7.17%) and the density of little millet *chakli* (0.79 g/cm³) was higher than that of the rice *chakli* (0.70 g/cc³). The water absorption index of both little millet and rice *chakli* flour mix was 3 g/g and oil absorption index was 2 g/g (Table 1). Particle size plays an important role in producing a crispy product (Bhattacharya and Narasimha, 2008). The sieve analysis of little millet *chakli* flour mix in comparison with rice *chakli* flour mix showed that 78.19 per cent of the little millet *chakli* flour mix was retained in 200 mesh (75 µm) sieve whereas 61.88 per cent of the rice *chakli* flour mix was retained in 240 mesh (63 µm) sieve (Table 2) which indicated that the little millet *chakli* flour mix was coarser compared with rice *chakli* flour mix. So, little millet is an ideal *chakli* flour mix with a coarse particle size which may have contributed to the improved sensory quality of the little millet *chakli*. However, the better textural properties of the rice may be due to the distinct properties of the starch present in the rice. Significant quality variation in physical and chemical attributes of little millet and rice *chakli* sample may be due to the particular properties of the different grains.

Acceptability of *Chakli* Prepared From Rice and Millet

The sensory assessment of rice *chakli* was significantly higher than little millet *chakli* (Table 3). However the acceptability scores of little millet *chakli* was also within the acceptable range.

Proximate Composition of Rice *Chakli* in Comparison With Millet *Chakli*

The proximate composition of little millet *chakli* and rice *chakli* differed significantly for all nutrients (Table 4). Result showed that the per cent protein, fat, crude fibre and ash contents were higher in *chakli* prepared from little millet. The higher fat content in little millet *chakli* may be due to higher absorption of fat from the bigger particle size of the flour (Bhattacharya and Narasimha, 2008) while the higher content of other nutrients may be attributed to the higher protein, fat, ash and crude fibre content of little millet (Gopalan et al., 2009). Similar increase in protein and ash content was observed by Senthil et al.(2002) in rice soy snack.

Conclusion

The sensory evaluations revealed that *chakli* prepared with 100 per cent little millet scored within the acceptable range. Little millet being the local cereal and available from the household food stuff with its nutrient content can be used for preparation of *chakli* to increase the nutritive value of *chakli* and diversification of the products. This also paves way for the newly designed novel *chakli* of little millet to be commercially popularized as a nutri-snack in millet growing areas.

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Table - 1. Physical and descriptive quality of little millet flour mix and chakli in comparison with rice

Chakli mix	Volume (ml)	Density (g/cc ³)	Water absorption g/g	Oil absorption g/g	Descriptive quality
Little millet	6.33 ± 0.58	0.79 ± 0.07	3.00 ± 0.00	2.00 ± 0.00	Light golden brown, crispy, good taste, good flavour
Rice	7.17 ± 0.29	0.70 ± 0.03	3.00 ± 0.00	2.00 ± 0.00	Light golden brown, highly crispy, good taste, good flavour

Values are mean ± Standard deviation of three determinations

Means in the same column with different superscript letters are significantly different (p<0.05)

Table- 2. Sieve analysis of little millet chakli flour mix in comparison with rice

Flour mix	Different fractions (%) of flour retained on the sieve				
	100 mesh (150 µm)	150 mesh (105 µm)	200 mesh (75 µm)	240 mesh (63 µm)	300 mesh (53 µm)
Little millet	5.68	8.52	78.18	6.02	0.64
Rice	3.94	7.06	26.36	61.88	0.76

Values are mean ± Standard deviation of three determinations

Table- 3. Organoleptic Profile of little millet chakli in comparison with rice

Chakli	Appearance and colour	Texture	Flavour	Taste	Over all acceptability
Millet	8.1 ± 0.57 ^a	7.5 ± 0.85 ^a	7.7 ± 0.95 ^a	7.7 ± 0.67 ^a	7.5 ± 0.71 ^a
Rice	8.2 ± 0.79 ^a	8.3 ± 0.82 ^b	8.1 ± 0.74 ^b	7.9 ± 0.88 ^b	8.2 ± 0.79 ^b

Values are mean ± Standard deviation by 10 panellists, Means in the same column with different superscript letters are significantly different (p<0.05) .

Table - 4. Proximate compositions of little millet chakli in comparison with rice

Chakli	Moisture	Protein	Fat	Ash	Crude fibre	Carbohydrate	Energy
Little millet	2.31±0.17 ^a	12.75±0.58 ^a	32.89±0.86 ^a	3.49±0.09 ^a	2.62±0.15 ^a	45.94±0.98 ^a	530.77 ^a
Rice	3.89±0.18 ^o	11.16±0.23 ^d	31.92±0.33 ^c	3.19±0.03 ^o	1.32±0.16 ^o	48.22±0.38 ^d	524.8 ^a

Values are mean ± Standard deviation of three determinations

Means in the same column with different superscript letters are significantly different (p<0.05).