

# Evaluation of Nutrient Content in Chikkies Developed from Popped Little Millet

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**Abstract:** ***Aim:** The present study aimed at making the millets available to people in ready-to-eat form with some enhanced nutritional properties. Little millet (*Panicumsumatrense*) was selected for this purpose as this millet has been mostly neglected by research groups addressing millets from around the world. Little millet was popped like popcorn to make it available in a ready-to-eat snack format. **Objectives:** Developing Popped little millet chikkies by using Popped little millet. Determining the nutritive value of Popped little millet chikkies **Materials and Methods:** Popped little millet chikkies were made by using the traditional standard recipe. Ingredients such as Popped little millet, roasted Bengal gram, groundnuts, gingelly seeds, and jaggery were selected to prepare the popped little millet chikkies. Little millet was popped by using a particulate medium (salt). **Results and Discussion:** A sudden and marked improvement in iron content from 8.9 mg in native millet to 18.7 mg in popped millet was noticed. It was deduced the study that popping was the best method in improving iron availability.*

**Keywords:** Little millet, chikki, popping, iron rich foods, millets

## 1. Introduction

Millets have a vast scope for not only supporting the commercially grown crops by reducing pressure on their availability but they are cheap source of nutrients and can be raised at low management cost (Aarti *et al.*, 2004). India produces nearly 17.7 million tonnes of millet annually, amounting to 40% of its global production. It is also termed as 'nutricereal' in view of its good nutritional specialties such as complex carbohydrates, high proportion of dietary fibre and other of phytochemicals with nutraceutical qualities (Vanithasri *et al.*, 2012). Millet is a major staple food crop in India for people of low income groups. Nutritionally, its importance is well recognized because for its high content of calcium, dietary fibre and phenolic compound. They are also recognized for their health beneficial effects, anti diabetic, anti tumerogenic, atherosclerogenic effects, antioxidants and anti microbial properties. The millets are source of antioxidants, such as dietary fibres (soluble and insoluble), phenolic acids and glycated flavonoids. Millet foods are characterized to be potential prebiotic and can enhance the viability or functionality of probiotics with significant health benefits (Vinita and Karuna, 2015).

Little millet (*Panicumsumatrense*) is grown throughout India to a limited extent up to altitudes of 2100 m but is of little importance elsewhere. It has received comparatively little attention from plant breeders (Daniel Sundararaj and Thulasidas, 1993).

Nutritionally the grains are comparable or even superior to major cereals. The grain protein is rich in essential amino acids. Little millet has a significant role in providing nutraceutical components such as phenols, tannins and phytates along with macro and micro-nutrients. Little millet is rich in fibre, iron and carotene content. (Itagi, 2003).

A study on nutrient composition, fibre fractions and value added products of Little millet show that among the macronutrients, moisture ranged 5.77-11.38 per cent and the protein (g) content ranged from 9.80 to 12.49. The amount of

fat, ash, crude fibre and carbohydrates were in the range of 2.87-5.09, 0.98-4.78, 0.49-8.72 and 62.25-76.59g/100g respectively. Further the energy ranged between 332.26 to 382.41Kcal. Micronutrients (mg/100g) present were calcium (18-24), phosphorous (215-232), iron (3.0-10.5), potassium (125-131), sodium (6.3-7.8); zinc (2.63-4.20), copper (0.6-1.0) and silicon (0.07-1.97). Further, the total dietary fibre ranged from 9.22 to 17.46 out of which, neutral detergent fibre (35.50-46.12), acid detergent fibre (13.95-16.43g/100g) were important. The study demonstrated that little millet is not only a source of nutrients but also rich source of fibre. Hence, there is need to explore the opportunities towards development of diversified foods for household consumption to achieve nutrition security on sustainable basis (Usha R *et al.*).

Among different genotypes of Little millet, the iron content ranged from 31.72 ppm in CO-2 to 35.10 in IGL-68 variety. Among different genotypes of Little millet, a narrow range but higher Zn content was observed, which was 30 ppm in CO-2 to 33 ppm in Kodo millet and little millet were also reported to have 37 to 38% of dietary fibre, which is the highest among the cereals; and the fat has higher polyunsaturated fatty acids (Hegde PS, *et al.*, 2005).

Hence the present study aims to develop chikkies using little millet.

## 2. Methodology

The methodology pertaining to the study entitled "Evaluation of Nutrient Content of Popped Little Millet Chikkies" is presented under the following headings.

### 1) Selection of raw materials

In the present study ingredients such as little millet, roasted Bengal gram, groundnuts, gingelly seeds, and jaggery were selected to prepare the popped little millet chikkies. Little Millet was procured from the local market of Madurai because of its easy proximity. Other ingredients such as roasted Bengal gram, ground nuts,

gingelly seeds and jaggery were purchased from nearby departmental store. The ingredients were cleaned and foreign particles were removed and stored in proper containers.

## 2) Processing of materials

### a. Popping of Little millet

Popping of cereals is an old practice of cooking grains since time immemorial to be used as snack. Popping improves the nutritional value by inactivating some of the antinutritional factors (enzymes and enzyme inhibitors) and thereby enhancing the protein carbohydrate digestibility; it also enhances the appearance, colour, taste and aroma of the processed raw materials (Mangala et al., 1999). In the present study little millet was popped by using a particulate medium the hot salt and popping was observed in less than two minutes. The popped grain was manually sifted from the unpopped grain and salt using a metallic strainer.

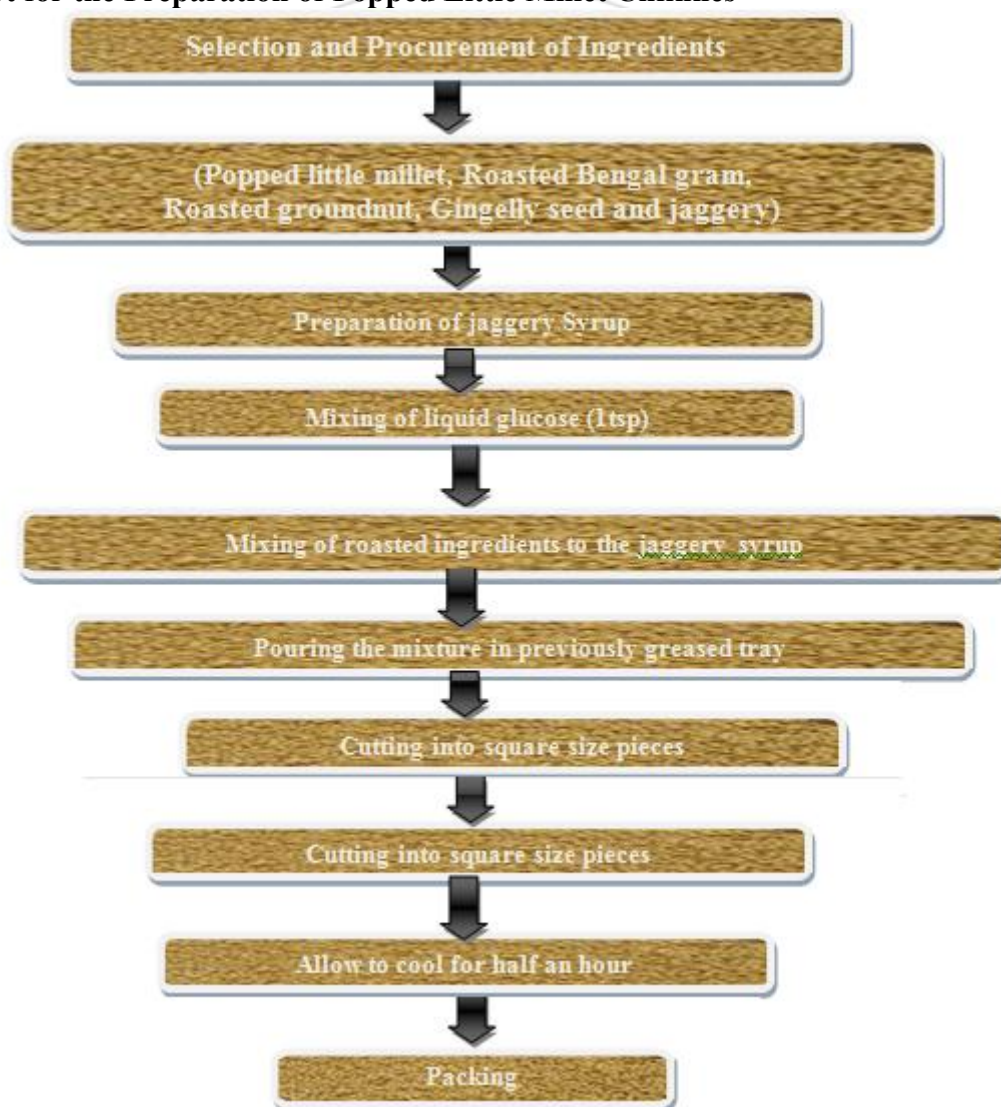
### b. Processing of other ingredients

The other ingredients such as roasted Bengal gram, groundnuts, gingelly seeds were roasted (110-120 °C) until sufficiently dried and became crisp and brittle to touch (Hirdyani, 2015).

### 3) Preparation of Popped little millet chikkies

Popped Little millet Chikki was made by using the traditional standard recipe (Hirdyani, 2015). Jaggery and all ingredients were taken in equal amounts. Jaggery was crushed and heated till the hard crack stage (150°C). Pre weighed ingredients were added to this jaggery syrup and were mixed thoroughly to cover the ingredients properly. Hot mass was then transferred on to a wooden board which was already greased. The mass was then spread uniformly with help of a roller. Vertical and horizontal lines were marked with a knife or cutter to make uniform pieces and then cooled to room temperature (27 °C). The Chikkies were then packed in polypropylene pouches.

## 3. Flow Chart for the Preparation of Popped Little Millet Chikkies



## 4. Evaluation of Nutrient Content of Popped Little millet Chikkies

Popped little millet chikkies were analysed for selected nutrients such as Moisture, Energy, Carbohydrate, Protein,

Fat, and Iron, using standard procedures (AOAC, 1995). For this analysis, several analytical grade reagents and laboratory grade ingredients were used. The principles were as follows.

#### 4.1. Determination of Carbohydrate

The carbohydrate content can be measured by hydrolysing the polysaccharides into simple sugars by acid hydrolysis and estimating the resultant monosaccharides. (Sadasivam,2003).

#### 4.2. Determination of Protein

Protein content of the samples were estimated from the amount of nitrogen present in the sample, Nitrogen content was determined by Kel plus (Sadasivam and Manikam, 1996).

#### 4.3. Determination of crude Fat

Crude fat was estimated using SOCS plus apparatus (Berwel *et al.*, 2004).Fats are fatty acids esters of glycerol. Fat as liquid is called oil. Seeds like groundnut, gingelly seeds, castor, sunflower etc., contain oil as reserve food material for the embryo.

#### 4.4. Determination of crude Fibre

The term crude fibres ordinarily meant in agriculture and food analysis is the organic residue containing largely of cellulose that is left after the other carbohydrates, proteins have been removed by successive treatment with boiling acids and alkalis. The crude fibres obtained in this way is not cellulose but contains distinct properties of hemi cellulose and nitrogenous substances. These however are not sufficient to prevent the results from being reasonably accurate and comparable.

#### 4.5. Determination of Iron

Iron in food was determined by converting the iron into ferric from using the oxidizing agent like potassium per sulphate or hydrogen peroxide and treating thereafter with potassium thiocyanate which was measured colorimetrically at 480nm.

### 5. Results and Discussion

The present table indicates the evaluated nutrient content of popped little millet Chikkies.

Nutrients	Nutritivevalue
Carbohydrate	54.73 g
Protein	12.01 g
Fat	7.14 g
Fibre	5.74 g
Iron	10.42 mg

The above table indicates the nutritive value of popped little millet chikkies, in which carbohydrate, protein, fat, fibre and iron present at 54.73g, 12.01g, 7.14g, 5.74g and 10.42mg respectively. A sudden and marked improvement in iron content from 8.9 mg in native millet to 18.7 mg in popped millet was noticed. It was deduced the study that popping was the best method in improving iron availability.

### 6. Conclusion

The developed chikkies were nutritionally evaluated by standard methods. Carbohydrate, Protein, Fat, Fibre and Iron content was examined. The results revealed that the developed chikkies contains higher percentage of iron than other nutrients. So, popped little millet chikkies is highly preferable for anaemic adolescent girls and people suffer from iron deficiency complications.

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