



Nutritional and Sensory analysis of Iron Rich Extruded Snacks Product Murukku of Moringa Oleifera

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Abstract: Snacks are described as a small quantity of food eaten between meals or in place of a meal. Snacks are a part of a healthy diet for children. Creating a healthy snack consumption pattern can help to provide children nutritious food throughout the day. Present study was undertaken to evaluate the quality of murukku supplemented with different proportion of Moringa Powder. The goal of the current study was to assess the quality of murukku that had been added with various amounts of moringa powder. Three treatments (T1, T2, and T3) of murukku were made using rice flour and various amounts of moringa powder, whereas the control sample had just 100% maida. The nutritional value and sensory quality of each therapy were assessed. Different types of murukku are produced. They are deep-fried, round coils that are golden brown in hue. They have excessive cholesterol levels, which contribute to obesity and cardiac issues. Drumsticks are a rich source of both essential and harmful elements. The whole tree can be used for medical, dietary, and other purposes. For people of all ages, drumsticks may be a very beneficial source of many nutrients. The highest amount of iron, beta carotene, and micronutrients including protein, vitamin C, folic acid, zinc, calcium, and potassium can all be found in drumsticks (Gopalan, 2000). Drumstick powder has been prepared for this investigation using the sun-drying technique. Each product underwent three replications, one control, and three treatments. Sensory evaluation of the produced product. According to sensory analysis, T2 (7.80) was the best treatment in the Murukku product among the three that are "liked moderately and liked slightly." The study concludes that due of its high acceptance and nutritional and medicinal value, drumstick may be utilised to produce enriched food items.

Keyword: Moringa oleifera, organoleptic property, Murukku, Nutrients.

1. INTRODUCTION:

Moringa oleifera Lam. is a tree that grows widely in many tropical and subtropical countries. It is grown commercially in India, Africa, South and Central America, Mexico, Hawaii, and throughout Asia and Southeast Asia. It is known as the drumstick tree based on the appearance of its immature seed pods, the horseradish tree based on the taste of ground root preparations, and the ben oil tree based on seed-derived oils (Choudhary, et al., 2013). Drumstick leaves also contain good amount of folates, Thiamine, Pyridoxine and Niacine, Antioxidants such as Flavonoids. Drumsticks are full of essential disease preventing nutrients. In some areas, immature seed pods are eaten, while the leaves are widely used as a basic food because of their high nutrition content (Mbikay, 2012; Razis et al., 2014). No human clinical trials have been conducted looking at the efficacy of *M. oleifera* for treating undernutrition.

In traditional medicine, seeds, leaves, oil, sap, bark, roots, and flowers are frequently employed. According to Razis et al. (2014), moringa leaves have been shown to have a healthy nutritional balance, including vitamins, minerals, amino acids, and fatty acids. Various types of antioxidant chemicals, including ascorbic acid, flavonoids, phenolics, and carotenoids, are also said to be present in the leaves (Alhakmani et al., 2013; Vongsak et al., 2014). Various preparations of *M. oleifera* are used for their antiinflammatory, antihypertensive, diuretic, antimicrobial, antioxidant, antidiabetic, antihyperlipidemic, antineoplastic, antipyretic, antiulcer, cardioprotectant, and hepatoprotectant activities, according to several commentaries (Mbikay, 2012; Razis et al., 2014).



Snacks are one of the most preferred delicacies in India. People all over the country enjoy a great culinary experience with various types of snacks. With increase in the consumer base and the change in the food habits, especially in the urban areas, foreign companies and food chains are entering the Indian market with their food and snacks products. The consumption of snack foods does not necessarily lead to health problems such as obesity, but the cause is rather the consumption of a snack that has excess fat, sugar and salt (Harris *et.al*, 2009). The objective of this investigation was critically planned to assess the characteristics of Moringa oleifera powder in a order to further use a functional food ingredient in the food and pharmaceutical products of concern also basically to enhance this important less explored readily available in certain parts of the country in a self-stable easily usable from the masses for the purpose (Ghiridhari *et al.*, 2011). The leaves can be dried, ground into a powder and stored without refrigeration conditions for many months and without loss of nutrients. The dried powder is completely edible and is used in soups and a variety of traditional foods. The Moringa leaves are quite versatile as they can be eaten fresh, cooked, or stored as dried powder. the powdered Moringa are packed with nutritional properties as they are a rich source of protein (23.78g/100g), fiber (11.8g/100g), Beta carotene (36800ug/100g), vitamin C (56g/100g) and minerals like calcium (3467mg/100g), iron(19mg/100g), phosphorous(215mg/100gh) and potassium (1467mg/100g) (Moyo *et al.*, 2011; Teixeira *et al.*, 2014). The Moringa oleifera also perform various pharmacological activities in our system, such as analgesic, antihypertensive, antitumor activity, and anti-inflammatory effects (Sreelatha and Padma 2011).

2. Methodology :

Raw materials i.e. Drumsticks was purchased from Chandra Shekhar Azad University of agriculture and technology, Kanpur. Pearl millet and corn was purchased from the local market of Kanpur. Other ingredients from for making pasta were also purchased from the local market in a single lot. For preparation Moringa flour, Wash the Moringa pods and leaves. Then remove the outer layer of Moringa pods. Now Moringa pulp, pods, leaves spread on the cloth and let it dry in sunlight and cover with mosquito net while drying. After drying, dried Moringa put into mixer and crumble them into fine powder and sieved to get fine powder. after drying, we grind finely powder form Drumstick, Rice and Maize and sieve with the help of Muslin cloth. Then mixed the drumstick powder, rice flour and maize flour in a bowl and also mixed the celery, asafoetida, fennel seeds and salt to taste. Then mix all ingredients. Then after boiled the water on slow flame and mixture in to it and continuously running by spoon. When it cooked and cool it and prepared the soft dough. Then after filled the little dough in murukku machine and make the murukku in desirable shape. Then after, well dried the murukku in sunshine for two days. After drying, keep murukku in air tight container.

Sensory analysis of Moringa Murukku

Sensory evaluation (9 point hedonic score card) Sensory evaluation of the control and formulated product was done using a semi-trained panel of 30 members. The panelists scored on the basis of Color and appearance, odour, flavour, texture and overall acceptability on a 9-point hedonic scale as described by FAO (Food and Agriculture Organization).

Statistical analysis

The results were statistically analyzed by determining Arithmetic mean. The difference in quality parameters and acceptability scores of the product were determined statistically using analysis of variance techniques using Completely Randomized Design (CRD) (Snedecor Sand Cochran, 1968).

3. Result and Discussion :

The results of the present study the nutritional and organoleptic characteristics of fortified murukku developed from drumstick were summarized below: Nutritional characters that were studied included Moisture, Ash, Protein and Iron content.

Control- 100%

T1- 50% rice flour+30%corn flour+5% Drumstick powder

T2 – 50% rice flour +30%corn flour +10%Drumstick powder

T3 – 50% rice flour +30% corn flour + 15% Drumstick powder



Table 1.1: Nutritional analysis of Moringa Murukku

Product	Moisture	Ash	Protein	Iron
Murukku control	2.74 ± 0.23	11.16 ± 4.50	6.98 ± 0.9	17.22 ± 0.15
Murukku T1	1.94 ± 0.09	11.93 ± 1.50	11.78 ± 0.8	26.60 ± 0.12
Murukku T2	2.28 ± 0.06	11.47 ± 2.29	9.58 ± 0.09	31.33 ± 0.013
Murukku T3	1.93 ± 0.15	11.03 ± 1.96	10.36 ± 0.11	28.44 ± 0.06
CD	0.49	N/A	0.31	0.41

Values are Mean ± S.E. of 3 determinations

The data in table 1.1 shows that the moisture content of the murukku range from 2.74 -1.93%. maximum moisture content in control (2.74 %), whereas treatment 3 showed minimum (1.93%). The ash content of the murukku range from 11.16 -11.03%. maximum ash content in treatment 1 (11.93%), whereas treatment 3 showed minimum (11.03%). The protein content of murukku ranged from 6.98 – 10.36%. maximum protein content in treatment 1 (11.78%), whereas control showed minimum (6.98%). The data in table shows that the iron content of murukku ranged from 17.22-28.44mg/1000gm. Maximum score of treatment 2 (31.33mg/1000gm), whereas lowest iron content was recorded in control murukku (17.22mg/1000gm).treatment 1 and treatment 3 had 26.60mg/1000gm and 28.44mg/1000gm iron content, respectively. From the results of present study reported that the iron content of all types of murukku differed significantly.

Table 1.2: Sensory analysis of Moringa Murukku

Products	Appearance	Taste	Flavour	Colour	Texture	Overall acceptability
Control	5.70 ± 0.19	5.36 ± 0.18	5.33 ± 0.23	5.03 ± 0.22	5.50 ± 0.28	5.80 ± 0.16
T1	7.40 ± 0.12	7.40 ± 0.15	7.53 ± 0.10	7.63 ± 0.08	7.60 ± 0.13	7.77 ± 0.14
T2	7.53 ± 0.10	7.25 ± 0.16	7.33 ± 0.13	7.46 ± 0.12	7.70 ± 0.17	7.80 ± 0.13
T3	7.83 ± 0.13	7.60 ± 0.10	7.63 ± 0.10	7.53 ± 0.13	7.60 ± 0.13	7.67 ± 0.15
CD (P≤0.05)	0.59	0.56	0.52	0.57	0.50	0.49

Values are mean ± SE of Thirty Independent Determination

The data in table 1.2 shows that the mean score of appearance of moringa murukku ranged from 5.70 -7.83. Maximum score of 7.83 was shown by T3 sample, falling in ‘like moderately’ category. Maximum score of 7.60 was shown by t3 sample for taste of murukku, falling in like moderately category and minimum score of 5.36 was shown by control sample, falling in ‘neither like nor dislike’ category. Mean score of flavour of moringa murukku ranged 5.33-7.63. Maximum score of 7.63 was shown by t3 sample. Maximum score of colour of murukku 7.63 was shown by T1 sample and 7.53 was shown by T3 sample. Maximum score of texture of moringa murukku 7.70 was shown by T2 sample and 7.60 was shown by T3 and T2 sampler. Maximum score of overall acceptability moringa murukku ranged 7.80 was shown by T2 sample and 7.77 was shown by T1 sample. While T1, T2 and T3 sample result were also encouraging T1, T2, and T3 sample was like moderately achieving 7.77, 7.80 and 7.67 score. The overall acceptability of all types of murukku was differed significantly in comparison to control murukku.

4. Conclusion :

From the present study, it can be concluded that sensory attributes as well nutritional attributes increased with the addition of *moringa olifera* leaves powder. All published studies in human subjects have used powdered leaf preparations, while the majority of animal studies have used aqueous, hydroalcohol, or alcohol extracts of *M. oleifera* leaves or other plant parts. So, it can be added as ingredient in preparation different food products which can be included in daily diet pattern of every household.

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