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Soumya Hiregoudar
Ph.D. Scholar, Department of
Food Science and Nutrition,
University of Agricultural
Sciences, GKVK, Bengaluru,
Karnataka, India

Bhavana A
Ph.D. Scholar, Department of
Food Science and Nutrition,
University of Agricultural
Sciences, GKVK, Bengaluru,
Karnataka, India

Akshay R Patil
Ph.D., Department of Food
Science and Technology,
National Institute of Food
Technology, Entrepreneurship
and Management (NIFTEM),
Ministry of Food Processing
Industries (MoFPI), Government
of India, Pudukkottai Road,
Thanjavur, Tamil Nadu, India

Corresponding Author:
Soumya Hiregoudar
Ph.D. Scholar, Department of
Food Science and Nutrition,
University of Agricultural
Sciences, GKVK, Bengaluru,
Karnataka, India

Tamarind lollipops: A multifaceted evaluation of nutrient content and sensory experience

Soumya Hiregoudar, Bhavana A and Akshay R Patil

Abstract

Tamarind is having good amount of CHO (67.8), protein (3.1g), potassium (375 mg), phosphorus (110 mg), iron (17 mg), calcium (170 mg), thiamine (0.16) and niacin (0.7 mg). Due to high acidity the utilization is limited. Hence, two variations of Tamarind lollipops were developed, viz, Tamarind-lollipop (T₁) and Tamarind-lollipop with curry leaf powder (T₂). The sensory profile indicated good aroma (8.5), colour (8.7), taste (8.3) and overall acceptability (8.2) in T₂ when compared with T₁ initially as well as till the end of duration of 30 days. The nutritive value per serving (5 gm) indicated good amount of nutrients for T₂ (Protein: 7.15, fat: 0.005 g, energy: 30 kcal and CHO: 7.15 g when compared with T₁). Hence, it is a low-cost nutritious Tamarind-lollipop that is most preferred by people of almost all age groups.

Keywords: Tamarind lollipops, sensory scores, nutritional profile

Introduction

Tamarind is native fruit of Africa belonging to Leguminosae family with botanical name *Tamarindus indica* L. The tamarind tree is prized for its shade and shelter. It is a tropical fruit tree which grows in dry monsoonal climates. The fruits are usually between 5 and 14 cm in length and approximately 2 cm wide [3]. The ripe fruit is filled with a sticky pulp which can be used both in industry and domestically in a variety of different ways. The tree averages 20-25 m in height and 1 m in diameter, it has a wide spreading crown and a short, stout trunk. It is slow growing, but long lived, with an average life span of 80-200 years [1]. Tamarind fruit, referred to as Indian date because of its appearance is highly valued for its versatility. It is also known as back bone of traditional medicine. It is known to contain the highest level of carbohydrates and protein. It has high amount of minerals like potassium, phosphorus, iron, calcium and vitamins such as thiamine and niacin. Among organic acids, tartaric acid is present throughout the stages of development of the fruit. Oxalic acid, succinic acid, citric acid and quinic acid are also reported in the tamarind. Ascorbic acid content is very less in the pulp [5]. Due to high acidity in the tamarind fruit, the utilization of these fruits for preparation of various processed products is limited. Tamarind also has hypoglycaemic and hypocholesterolemic effect and it helps in reducing obesity [5]. Multipurpose species, such as tamarind (*Tamarindus indica* L.), have an important role in local economies by supplementing the local diet and entering into traditional therapies.



Tamarind (*Tamarindus indica* L.)

India is the world's largest producer of tamarind products. It is particularly abundant in the states of Madhya Pradesh, Bihar, Andhra Pradesh, Karnataka, Tamil Nadu and west Bengal [7]. The value addition of tamarind or products of tamarind helps to enhance the nutritive value of the product. The variety of products can be developed with tamarind like tamarind jam, tamarind jelly, tamarind candy, tamarind pickle, tamarind juice etc. The objective of the study is to develop value added product like Tamarind lollipop enriched with curry leaves and to evaluate sensory quality and nutrient value.

Materials and Methods

The raw materials like Tamarind, Jaggery curry leaves cumin seeds, garlic, chilli powder and salt were procured from the local market at Bengaluru. The flowchart for preparation of Tamarind lollipop is presented in Fig.1

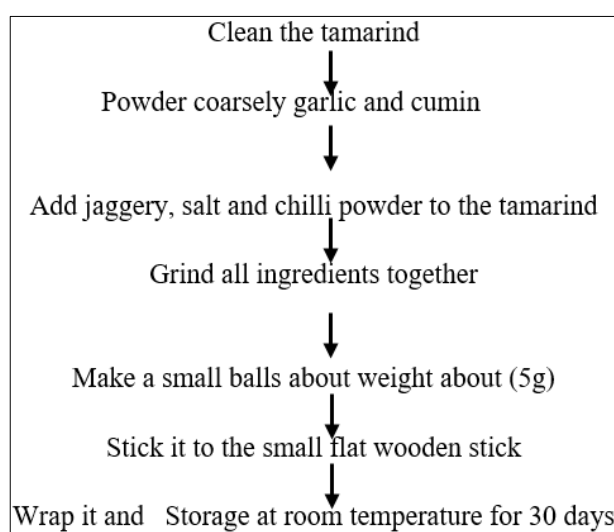


Fig 1: Preparation of Tamarind lollipop

Table 1: Percent composition of the Tamarind lollipops (200 g)

| Tamarind lollipop (T ₁) | | Tamarind lollipop with curry leaf powder (T ₂) | |
|-------------------------------------|--------------|--|--------------|
| Ingredients | Quantity (g) | Ingredients | Quantity (g) |
| Tamarind | 100 | Tamarind | 100 |
| Jaggery | 80 | Jaggery | 80 |
| Garlic | 5 | Curry leaves | 5 |
| Cumin | 3 | Garlic | 5 |
| Chilli powder | 3 | Cumin | 3 |
| Salt | 3 | Chilli powder | 1.5 |
| | | Salt | 1.5 |

Sensory evaluation

Sensory evaluation of the developed product was done with 9 point hedonic scale with the ratings of: 9 = Like extremely; 8 = Like very much; 7 = Like moderately; 6 = Like slightly; 5 = Neither like nor dislike; 4 = Dislike slightly; 3 = Dislike moderately; 2 = Dislike very much; and 1 = Dislike extremely, by a semi-trained panel for both products.

Evaluation of Nutritive value

The best accepted tamarind lollipops were powdered sieved through 40 mesh and stored in air tight sample containers. Analysis was done for the nutrients namely moisture, protein, fat, crude fiber, ash, calcium and iron by using standard procedure, carbohydrate was calculated by difference method and energy was computed. Results were expressed on dry

weight bases.

Cost estimation of the product

The economic analysis, following Kamaliya (2005) [5], involved calculating the raw ingredient costs based on current market prices. Production cost was determined by adding 50% as overhead charges to the basic cost. Selling price was set by adding a 25% profit to the production cost. The experimental product was sold at a premium, with an additional 10% premium charge over the standard selling price, resulting in extra income compared to the control product.

Statistical analysis

The obtained data was tabulated and analysed by keeping in view of the objectives and parameters of the study. All the analyses were performed in triplicate.

Result and discussion

Nutritive value of Tamarind pulp per 100 g of edible portion is indicated in Table-1. The tamarind pulp is a good source of calories, with 283 Kcal per 100 g, and contain moderate moisture at 20.9 g. They offer 3.10 g of protein, 0.1 g of fat, and 5.6 g of dietary fiber, making them a balanced snack option. Carbohydrates are predominant at 67.8 g, including 30-41 g of invert sugar. The lollipops provide essential minerals, with 170 mg of calcium, 110 mg of phosphorus, 17 mg of iron, and 24 mg of sodium. They are also rich in potassium at 375 mg. In terms of vitamins, they contain 0.16 mg of thiamine, 0.07 mg of riboflavin, and 0.6-0.7 mg of niacin. Additionally, they offer 0.7-3.0 mg of ascorbic acid and 8-23.8 mg of tartaric acid. These nutritional attributes make the lollipops a valuable and flavourful treat.

Table 2: Nutritive composition of Tamarind pulp

| Nutrients | Amount/100g |
|--------------------|-------------|
| Calories | 283Kcal |
| Moisture (g) | 20.9 |
| Protein (g) | 3.10 |
| Fat (g) | 0.1 |
| Fibre (g) | 5.6 |
| Carbohydrates (g) | 67.8 |
| Invert sugar (g) | 30-41 |
| Ash (g) | 2.9 |
| Calcium (mg) | 170 |
| Phosphorus (mg) | 110 |
| Iron (mg) | 17 |
| Sodium (mg) | 24 |
| Potassium (mg) | 375 |
| Thiamine (mg) | 0.16 |
| Riboflavin (mg) | 0.07 |
| Niacin (mg) | 0.6-0.7 |
| Ascorbic acid (mg) | 0.7-3.0 |
| Tartaric acid (mg) | 8-23.8 |

Sensory evaluation of the developed product

The mean sensory scores of both products indicated that appearance, colour, aroma and taste were more in T₂ compared to T₁. Tanginess was more in T₁ as compared with T₂. The overall acceptability was more in T₂ (8.2) compared with T₁ (7.3). (Table 2)

The presence of curry leaves enhanced flavour and Taste as curry leaves had a distinct citrusy flavour. T₂ was liked more by the members. Mamatha and Prakash (2016) [5] reviewed that since the candy was sour on account of tamarind, sweet

because of added sugar, spicy spices, for these categories. Spices contribute to specific taste quality of products. As Tamarind is more tangy, curry leaves added flavour and taste to the product. Overall acceptability was also more to the T₂. There was no significant change in the taste and appearance of the product for a period of 30 days.

Table 3: Mean sensory scores of the products.

| Sensory Parameters | T ₁ | T ₂ |
|-----------------------|----------------|----------------|
| Appearance | 8.0±0.21 | 8.3±0.13 |
| Colour | 8.4±0.13 | 8.7±0.22 |
| Texture | 8.2±0.22 | 8.0±0.19 |
| Aroma | 7.5±0.32 | 8.5±0.11 |
| Taste | 7.8±0.11 | 8.3±0.21 |
| Tangy | 8.0±0.14 | 7.8±0.17 |
| Spicy | 7.8±0.18 | 7.5±0.13 |
| Overall acceptability | 7.3±0.19 | 8.2±0.16 |

Nutritive value of Tamarind lollipop

The Nutritive value of the best accepted formulation of value added tamarind lollipop were presented in Table 4.

Table 4: Nutritive value of Tamarind lollipop by computed method.

| Nutrients | Per 100 g | Per 5 g |
|------------------|-----------|---------|
| Moisture (g) | 30 ±0.21 | 1.5 |
| Energy (Kcal) | 589 ±1.23 | 30 |
| Carbohydrate (g) | 143±0.21 | 7.15 |
| Protein (g) | 3.1±0.21 | 0.156 |
| Fibre (g) | 5.6±0.11 | 0.28 |
| Fat (g) | 0.1±0.01 | 0.005 |

Results show that the computed nutritive value of the Tamarind lollipop per 100g has 30g of moisture, 589 Kcal of energy, 143g of carbohydrates, 3.1g of protein, 5.6g of fiber, and 0.1g of fat. When considering a 5g portion, it provides 1.5g of moisture, 30 Kcal of energy, 7.15g of carbohydrates, 0.156g of protein, 0.28g of fiber, and 0.005g of fat.

The increase in moisture and energy content per 100g



Tamarind lollipop (T₁)



Tamarind lollipop with curry leaf powder (T₂)

Conclusion

In conclusion, Tamarind lollipop, particularly the variant T₂, incorporating curry leaves, emerged as a promising value-added product of tamarind. The sensory evaluations indicated that T₂ received favorable scores in terms of taste and appearance aroma. Moreover, its affordability and nutritional value make it a compelling choice for consumers seeking both sensory delight and health benefits in a single treat. This

suggests that the lollipop may have a higher moisture content than expected, potentially affecting its shelf stability. The 5g portion size provides a more manageable energy intake for consumers while still offering a small amount of protein, fiber, and carbohydrates. Further investigation into moisture control during production may be necessary to ensure product quality and shelf life.

Cost estimation of the product

Cost estimation of the tamarind lollipop was done based on raw material cost, production cost, packaging material cost and selling price that includes profit and labour charge

Table 5: Cost estimation of Tamarind lollipop (for 100 gm)

| Parameters | Amount (Rs/100 g) |
|-------------------|-------------------|
| Raw material cost | 30 |
| Production cost | 10 |
| Packaging cost | 5 |
| Labour cost | 3 |
| profit | 2 |
| Selling price | 50 |

100 g of product produces 20 lollipopS = 50Rs.

Per consumption (5g = 1 stick)

Cost of one tamarind lollipop is 2.5 Rs.

Cost of four tamarind lollipop is 10 Rs.

Table 5, represents the cost estimation of tamarind value added lollipop for a 100g product, which produces 20 lollipops, the selling price is Rs. 50. When considering the consumption of one 5g stick, the cost of a single Tamarind lollipop is Rs. 2.5. Therefore, the cost of four Tamarind lollipops is 10 Rs. This cost breakdown suggests that the Tamarind lollipops are economically viable and offer a reasonable profit margin. The pricing strategy allows for individual lollipop affordability while ensuring profitability for the producer. It can be affordable to eat and enjoy the product. As it can be liked by children and all age group people.

suggests that Tamarind lollipops, especially those enriched with complementary ingredients like curry leaves, hold significant potential in the market as an appealing and nutritious confectionery option.

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