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Climbing brinjal incorporated popcorn: An innovative functional food development

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Abstract

Climbing brinjal (*Solanum trilobatumk*) leaf powder, known for its rich nutritional profile, has been successfully incorporated into healthy snack popcorn, presenting an innovative approach in functional food and nutritional therapy. This study aimed to develop and evaluate the nutritional and sensory properties of climbing brinjal powder incorporated popcorn. Climbing brinjal, rich in antioxidants and essential minerals, was dried and powdered. The powder was incorporated into popcorn at varying concentrations. The developed popcorn samples showed significant enhancements in nutritional content, including protein, fiber, and minerals. Sensory evaluation revealed acceptable flavor and aroma. The incorporation of climbing brinjal powder into popcorn emerged as a viable strategy to enhance its nutritional profile. This value-added snack offers a good source of essential nutrients and antioxidants, making it a potential healthy food option.

Keywords: Climbing Brinjal; Popcorn; Nutritional Enhancement; Antioxidant Activity; Sensory Evaluation; Value-Added Snack; Healthy Food Option

1. Introduction

Solanum trilobatum is one of the medicinal plants commonly available in different parts of the world and this plant is used in Indian system of medicine to cure various diseases in human and animals. Phytochemical screening of this plant extract proved the presence of major bioactive drugs such as sobatum, solasodine, tomatidine, disogenin and solaine in various parts of the plant including leaf, stem, root, flowers and berries to treat various diseases like tuberculosis, respiratory problems and bronchial asthma. Bioactive compounds have been tested for anti-microbial, anti-inflammatory, antioxidant, cytotoxic, anti-diabetic and immunomodulatory activities.

Nature consumes a birthplace of medicinal agents for thousands of years and a notable number of modern drugs arises from the natural sources. *Solanum trilobatum* L. is a flowering shrub of the family Solanaeace and originates in some of the warmer parts of the tropical and the subtropical areas. It is an erect branching herb widely distributed throughout the Indo-Malaysian regions and southern India, although it has a traditional medicinal use in the areas where it is cultivated for treating various ailments.

Popcorn is a snack food with significant commercial popularity. Popcorn popping mechanics can be described by a series of polymeric transformations. The most important quality traits for popcorn are expansion volume and “eatability” factors, including unpopped kernels, hull dispersion, and the color, texture, and flavor of popped flakes. Popcorn quality depends on both intrinsic factors, such as hybrid selection, kernel conditioning, and kernel physiochemical attributes, and extrinsic variables, including popping method and ingredient additives. Developing new technologies and establishing new quality attributes for popcorn may help to further increase consumer liking and consumption.

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This study aimed to develop and evaluate the nutritional and sensory properties of climbing brinjal powder incorporated popcorn. Climbing brinjal, a rich source of antioxidants and essential minerals, was dried and powdered. The powder was then incorporated into popcorn at different concentrations (1%, 1.5%, and 2%). The developed popcorn samples were evaluated for their proximate composition, antioxidant activity, and sensory attributes.

Objectives

- To develop a unique and delicious Climbing brinjal popcorn recipe that showcases the flavour and nutritional benefits of climbing brinjal.
- To create a unique and delicious climbing brinjal popcorn using climbing brinjal powder as the primary ingredient.
- To investigate and optimize the use of natural and preservatives to enhance the flavor and shelf life of the climbing brinjal popcorn.

2. Materials and methods

2.1. Procurement of raw materials

The raw materials such as raw corn, climbing brinjal powder, salt, onion garlic powder, butter, periphery powder in local super market.

2.2. Methods

2.2.1. Standardization of climbing brinjal leaf powder incorporated popcorn

To formulate and standardize climbing brinjal leaf powder-incorporated popcorn, Melt 50g of butter in a pan over medium heat. Add 38g of raw corn kernels and sprinkle with salt and climbing brinjal powder. Cover the pan and cook until the popping stops. Finish with a sprinkle of peri masala and onion garlic powder to add extra flavor.

2.2.2. Nutrient composition of popcorn

Popcorn has a good glycemic index (GI) of 55. It contains no cholesterol; it is virtually fat-free (only 0.1 g per cup) and contains only 100 to 150 calories in a serving of five popped cups. Popcorn also has a number of essential vitamins including: folate, niacin, riboflavin, thiamin, pantothenic acid and vitamins B6, A, E and K. A serving of popcorn contributes about 8 percent of the daily value of iron.

2.2.3. Nutrient composition of Solanum trilobatum leaf powder

The fresh leaves of *S. trilobatum* are used as food supplement in South India. Leaves are cooked and eaten as vegetable. the analysis of nutritional value of leaves shows moisture, 84.7%; protein, 3.9g; fat, 0.7g; minerals, 3.8g; crude bre, 2.3g; and other carbohydrates, 4.6 g/100 g. Leaves reported to contain calcium, 334; phosphorous, 52; iron, 5 mg/100 g (Anonymous, 1972)

2.2.4. Organoleptic evaluation of climbing brinjal leaf powder incorporated popcorn

A comprehensive sensory evaluation of the climbing brinjal leaf powder-incorporated popcorn was conducted using a hedonic scale rating to assess its acceptability. The evaluation focused on key attributes such as appearance, texture, flavor, and aroma over 50 participants. Overall, the hedonic scale ratings indicated strong consumer acceptance, highlighting the product's balanced sensory attributes and potential as a functional food product.

3. Results

3.1. Nutrient composition of climbing brinjal leaf powder incorporated popcorn

The analysis of climbing brinjal leaf powder-incorporated popcorn revealed a nutrient-dense product with the following composition per 100g: energy 527 kcal, protein 6.3g, fat 43.37g, fibre 2.1g vitamin C 6.6mg, vitamin A 0.1mg, calcium 73.8mg and iron 4.57mg. This composition highlights the popcorn potential as a balanced and nutritious food option, leveraging the rich nutritional profile of climbing brinjal leaf powder.

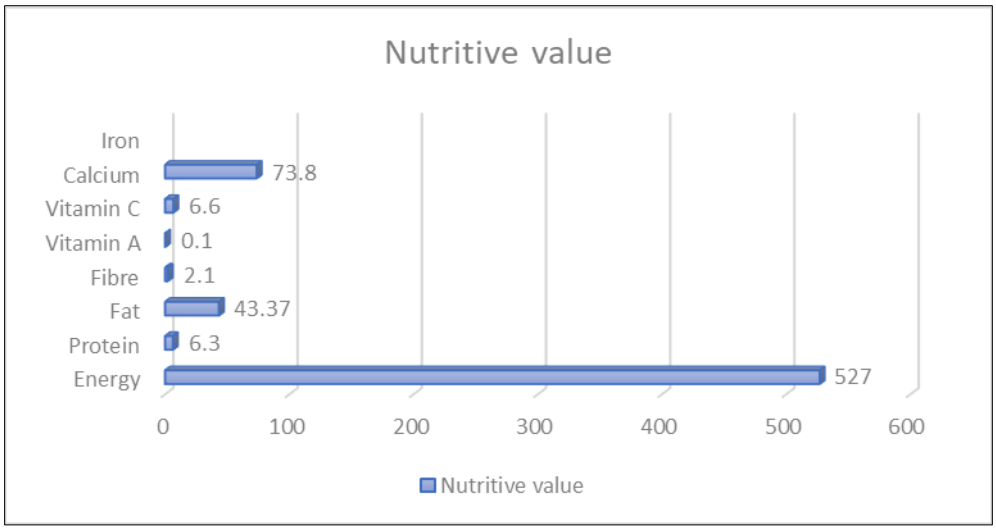

Figure 1 Nutrient composition of climbing brinjal leaf powder incorporated popcorn

3.2. Organoleptic evaluation of climbing brinjal leaf powder incorporated popcorn

The sensory evaluation, on a hedonic scale, checked the appearance, texture, flavor, and aroma of popcorn**.** Texture scored high in terms of satisfying crunch by good quality popcorn. The flavor profile of climbing brinjal leaf powder that complemented peri powder hide the bitterness of *Solanum trilobatum*. The aroma was inviting with the richness of peri and onion garlic powder. In general, nutritious was very acceptable, suggesting good prospects for consumer acceptance.

4. Discussion

The comprehensive study on climbing brinjal leaf powder-incorporated popcorn highlights its nutritional and therapeutic potential as a novel functional food. Nutrient analysis revealed the product's dense nutritional profile, including significant amounts of energy, protein, fats, fibre, vitamin C, vitamin A, and iron. Sensory evaluation, conducted using a hedonic scale, indicated strong consumer acceptance to the satisfying texture, flavor, and inviting aroma. The incorporation of climbing brinjal leaf powder not only enhances the nutritional value but also aligns with trends in personalized nutrition and therapeutic applications. The results underscore the importance of further research to validate these benefits and explore scalability for commercial production. This study contributes to the growing body of knowledge on functional foods, emphasizing the dual advantage of health promotion and environmental sustainability offered by incorporating natural, nutrient-rich ingredients like climbing brinjal leaf powder into everyday diets.

5. Conclusion

The study on climbing brinjal leaf powder-incorporated popcorn demonstrates its potential as a highly nutritious and therapeutic functional food. The nutrient analysis highlighted the popcorn's rich nutritional profile, including significant levels of essential nutrients like protein, fats, fibre, vitamins, and minerals. Sensory evaluation using a hedonic scale confirmed strong consumer acceptance, with high ratings for appearance, texture, flavor, and aroma. The integration of climbing brinjal leaf powder into the popcorn not only enhances its nutritional value but also aligns with contemporary trends in personalized nutrition and therapeutic applications, specifically for respiratory management. These findings emphasize the importance of incorporating natural and nutrient-dense ingredients like climbing brinjal leaf powder into everyday diets, contributing to health promotion and environmental sustainability. The study underscores the need for further research to validate the therapeutic benefits and explore scalability for commercial production, ultimately positioning climbing brinjal leaf powder-incorporated popcorn as a promising addition to the functional food market.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict-of-interest to be disclosed.

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