

Formulation and standardization of diabetes delight Paniyaram

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Abstract

Diabetes mellitus is a metabolic disorder characterized by high blood sugar levels, requiring dietary modifications to manage glucose levels effectively. "Diabetic Delight Paniyaram" is a nutritious and diabetes-friendly snack formulated for diabetic patients and children. The main ingredients - Psidium guajava (red guava), pearl millet, stevia sugar, dark chocolate, egg, and milk are carefully selected for their low glycemic index and high nutritional value. The preparation involves extracting guava juice, blending it with a batter made from sieved pearl millet flour, stevia-sweetened beaten eggs, and milk, with vanilla essence to improve flavor. The batter is then used to make soft paniyarams filled with dark chocolate, offering a healthy yet indulgent option. This recipe is rich in fiber, antioxidants, and essential nutrients, supporting better digestion and blood sugar control. "Diabetic Delight Paniyaram" provides a delicious, health-conscious alternative for those seeking sugar-free, nutritious snacks without compromising taste.

Keywords Diabetes-Friendly Snack; Low Glycemic Index; Psidium Guajava; Pearl Millet; Stevia Sugar; Dark Chocolate; Diabetic Diet; Antioxidant-Rich Food; Fiber-Rich Snack; Sugar-Free Dessert; Functional Food; Nutritional Snack.

1. Introduction

Generally consumed fresh, Red Guava fruit (Psidium Guajava) is famous for its distinctive flavour and freshness. The benefits of Red Guava can be attributed to its high concentration of favorable nutrients and nutrient profile. It is rich in lycopene, antioxidants, fiber, and vitamin C. These vitamins and minerals can improve heart, digestion, and blood sugar control.

Red guavas, often referred to as desert guavas, are pink in colour and sweet in flavour. You may find this variety of guava at your local market. In Hong Kong, this fruit is frequently sold. As a result, this breed is highly demanded. Vitamin C and fibre, which function as antioxidants, are abundant in Red Guava. These antioxidants can reduce or even reverse the harmful effects of oxidation.

Guava is frequently associated with catching a cold, which may be true. However, it has considerable health advantages. Like red guava, lali guava also has multiple health benefits. Additionally, Red Guava helps treat conditions including high blood pressure, diarrhoea, diabetes, cough, and several kinds of cancers.

One of the healthiest fruits you can consume is a Red Guava. It offers sufficient amounts of several nutrients, many of which were already covered above. Guava can be consumed raw or added to fruit salads, smoothies, desserts, chutney, and other dishes. One guava can be consumed daily while in season. Patients with high blood pressure should avoid adding table salt or black salt to guava.

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1.1. Nutritional composition of red guava per serving are listed

- Calories - 68 kcal
- Carbohydrates - 14.32 g
- Fibre - 5.4 g
- Fats - 0.95 g
- Protein - 2.55 g
- Vitamin C - 75% of the daily recommended intake

Chocolate products, including dark chocolate, are derived from the beans of the Theobroma cacao tree, also known as the cacao or cocoa tree. Dark chocolate contains a higher percentage of cocoa than milk or semi-sweet chocolate, though the percentage varies depending on the type of dark chocolate purchased. Most dark chocolate products contain between 70 and 85% cocoa, though certain types can contain much lower and higher cocoa percentages. For example, highly dark chocolate can contain around 90% cocoa solids.

Because it's generally high in cocoa solids, dark chocolate is rich in minerals and protective plant compounds that may benefit health in several ways, such as improving heart disease risk factors and supporting digestive health.

1.2. Nutritional composition of dark chocolate per serving are listed

- Calories: 170
- Fat: 12.1 grams (g)
- Protein: 2.21 g
- Carbohydrate: 13 g
- Fiber: 3.09 g
- Sugar: 6.8 g

1.3. Objectives

- Develop a diabetes-friendly snack using ingredients with a low glycemic index.
- Incorporate nutrient-rich ingredients like guava, pearl millet, and stevia sugar.
- Ensure the snack is high in fiber and antioxidants for better digestion and health benefits.
- Maintain great taste while being suitable for diabetic patients and children.

2. Materials and methods

2.1. Materials

2.1.1. Procurement of raw materials

The raw materials used are red guava, egg, pearl millet, milk, dark chocolate, stevia sugar, oil.

2.1.2. Chemicals

The chemical reagents used for the study were vanilla essence, baking powder.

2.1.3. Utensils

Measuring cups, mixing bowl, fork, paniyaram bowl, spatula, plate, knife, spoon were used for preparing and serving the developed product.

2.1.4. Energy source

The electric current and liquid petroleum gas (LPG) were used as heating source.

2.1.5. Preparation of diabetic delight paniyaram

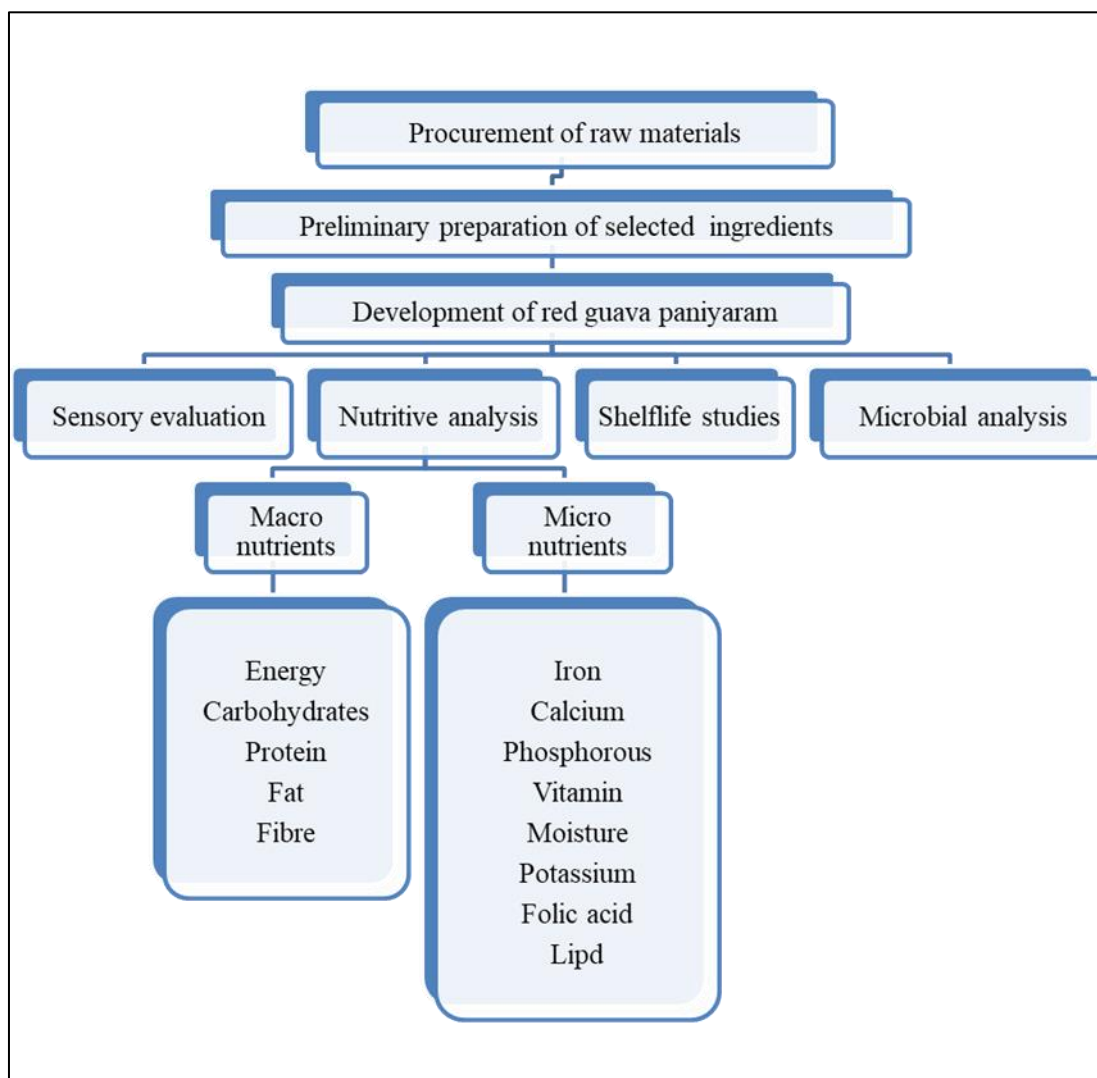


Figure 1 Overall procedure

2.2. Preliminary preparation of selected ingredients

The produced raw materials such as red guava, milk, egg, pearl millet, stevia sugar, dark chocolate.

The dried ingredients such as vanilla essence and baking powder are added to the red guava batter and should be poured in the paniyaram vessel.

2.3. Formulation of diabetic delight paniyaram with red guava juice

Diabetic delight paniyaram have high nutritive value and enormous health benefits. Red guava is incorporated in man products due to its nutritional value. Red guava is incorporated in the level of 20, 40, 60ml in the paniyaram batter respectively.

2.4. Development of diabetic delight paniyaram with red guava juice

The proportion of ingredients used to prepare its variation are given below

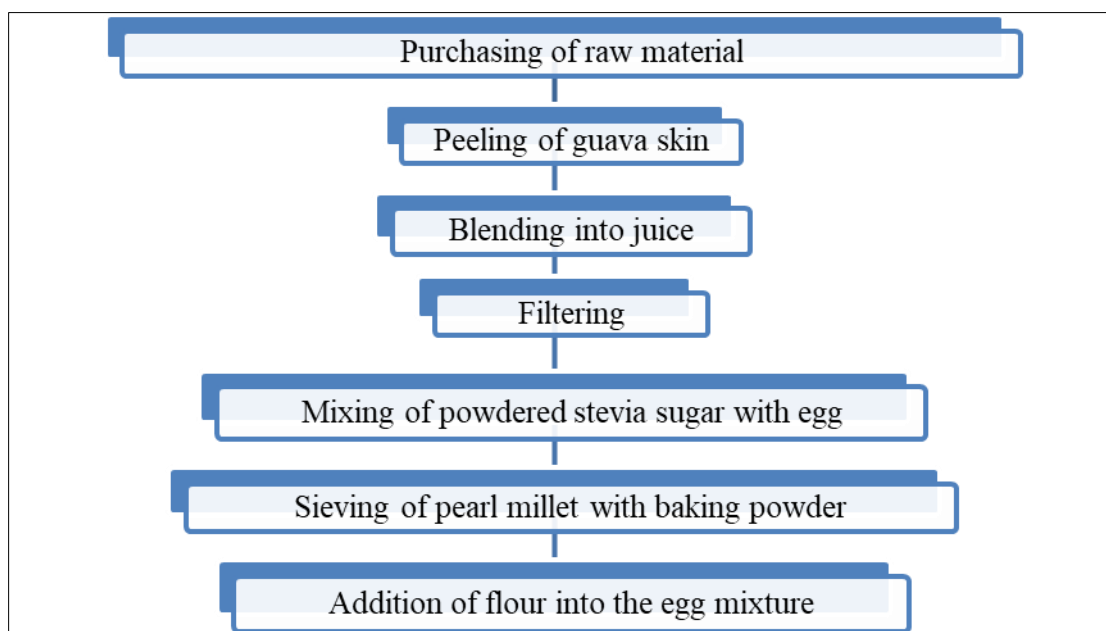
Table 1 Proportions of ingredients used in the development of diabetic delight paniyaram with red guava.

S.no	Ingredients	Quantity		
		DDP1	DDP2	DDP3
1	Red guava	60ml	40ml	20ml
2	Stevia sugar	5g	5g	10g
3	Pearl millet flour	50g	40g	20g
4	Dark chocolate	2g	2g	2g
5	Egg	5ml	5ml	5ml
6	Milk	10ml	20ml	30ml

- **DDP1-** 60ml of red guava juice is incorporated in diabetic delight paniyaram.
- **DDP2-** 40ml of red guava juice is incorporated in diabetic delight paniyaram.
- **DDP3-** 20ml of red guava juice is incorporated in diabetic delight paniyaram.

2.5. Procedure

Take fresh ripe red guava fruit. Peel the skin of the guava and blend them finely. In a bowl add eggs and powdered stevia sugar and beat well. Now sieve the pearl millet finely by adding baking powder for even spreading. Pour the flour in the egg mixture with the red guava juice that has been prepared already. Add milk to obtain thickness. Add few drops of vanilla essence to avoid egg smell. The batter is ready. Take the paniyaram vessel and heat it to the required temperature to avoid the sticking of batter. Pour little amount of batter followed by addition of dark chocolate and batter. Addition of dark chocolate is done mainly to attract the kids with diabetics. Now keep the vessel closed for 3mins at medium flame for each side for even cook. Once the once side of paniyaram is cooked properly turn it to the other side.

**Figure 2** Primary procedure

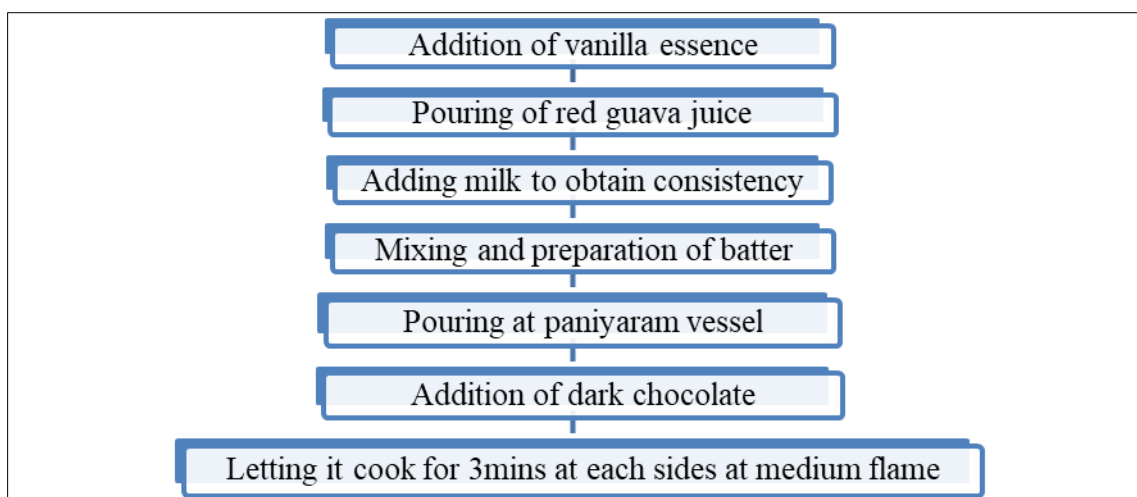


Figure 3 Secondary procedure

3. Organoleptic or sensory evaluation

The institute of food technologies (IFT) defines sensory evaluation as “The scientific discipline used to evoke measure, analyze, and interrupt those reactions to characteristics of food and raw materials as perceived through the senses of light, smell, taste, touch, and hearing.

When the quality of a food product is assessed by means of human sensory organs, the evaluation is said to be sensory or subjected or organoleptic evaluation. Sensory quality is a combination of different sense of perception coming in choosing and eating a food. Appearance, flavor and mouth feel decides the acceptance of the food. The developed food product along with its variation was evaluated by the panel of judges, by using 5 points hedonic scale rating.



Figure 4 Samples



Figure 5 Sensory evaluation

Table 2 Nutritive analysis

Nutritive composition	Pearl millet	Red guava	Dark chocolate	Stevia sugar	Total
Moisture(g)	11%	82.5%	0.75%	0.15%	94.4%
Protein(g)	11%	1.5%	6%	0%	18.5%
Fat(g)	4.5%	0.75%	32.5%	0%	37.75%
Mineral(g)	2.25%	0.85%	3.5%	0%	6.6%
Fibre(g)	9%	5.5%	11%	0%	25.5%
CHO(G)	62.5%	15%	47.5%	97%	222%

Energy(kcal)	335kcal	67.5kcal	525kcal	2.5kcal	950kcal
Calcium(mg)	45mg	19mg	55mg	0	119mg
Iron(mg)	8.5mg	0.28mg	11mg	0	19.78mg
Phosphorous(mg)	325mg	45mg	225mg	0	595mg
Carotene(mg)	27.5mg	812mg	10mg	0	849.5mg
Thiamine(mg)	0.45mg	0.075mg	0.15mg	0	0.675mg
Riboflavin(mg)	0.125mg	0.025mg	0.15mg	0	0.3mg
Niacin(mg)	3.25mg	1.25mg	0.4mg	0	4.9mg

For this study I referred this e journal- Jukanti AK et. al. 2012. Nutritional quality and health benefits of red guava(Cicer arietinum L.): a review. Br J Nutr. Suppl 1:S11-26

3.1. Shelf life analysis

Shelf life is the length of time that a commodity may be stored without becoming unfit for use, consumption or sale. The shelf life of my product is up to 5days. It is packed in the oriented polypropylene which holds the product for longer period without reducing the nutritional value of the product. After 5 days the product will develop a yeast formation. Otherwise, shelf life of the product remains same.

3.2. Packaging and labelling

The packaging is done with aluminum pouch. It is easy to use, lift and store the product. The packaging contains name, nutritive value, manufacture and expiry date, allergen present for clear information to the consumer about the product.



Figure 6 Packaging

Figure 7 Labelling

4. Results and discussion

Table 3 Sensory evaluation

Sensory attributes	Colour	Flavour	Texture	Taste	Appearance	Overall mean score
DDP1	4.3	4	4.5	4.3	4.3	4.3
DDP2	4.2	4	4	4.3	4.1	4.1
DDP3	4.2	4	4.2	4.1	4.4	4.2

The results revealed that DDP1 secured highest score & the sensory attributes which was more or is equal to the other developed products.

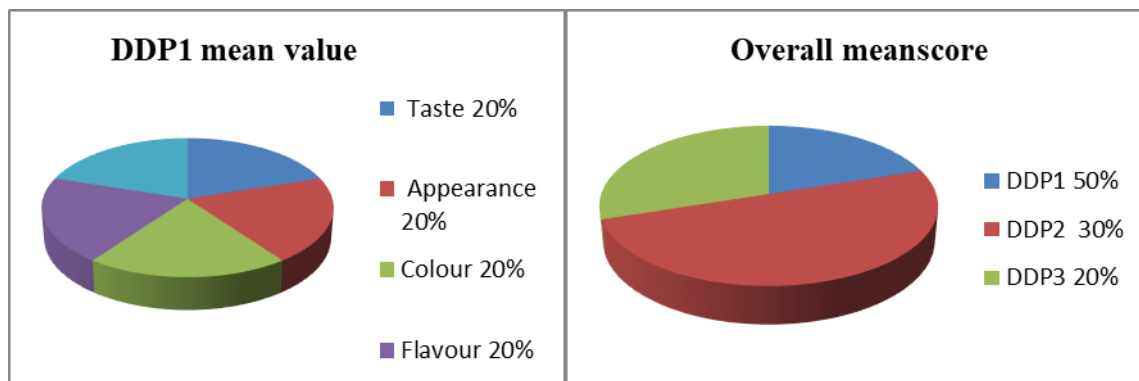


Figure 8 Sensory result

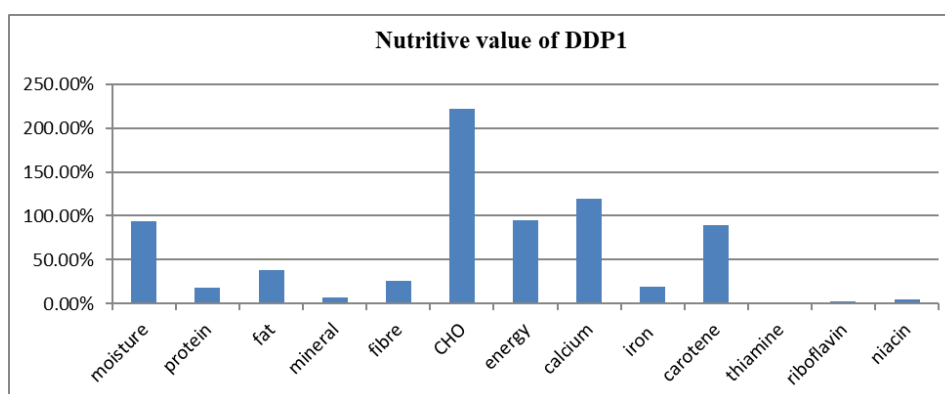


Figure 9 Nutritive value

5. Conclusion

The brief summary of the result of the study carried out to analyze diabetic delight paniyaram are dealt in this chapter the data in sensory attributes, nutritive value, packaging of the standardized product have been summarized and conclude value.

- Acceptability of the developed diabetic delight paniyaram and its variation.
- Nutrient analysis of the standardized of diabetic delight paniyaram.
- Shelf life analysis of standardized diabetic delight paniyaram.
- Packaging suitable for the product.

Compliance with ethical standards

Disclosure of conflict of interest

The author declares that there is no conflict of interest related to this study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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