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Formulation and development of poli incorporated with dried plantain flower powder

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Abstract
Plantain flower is a long, dark purple-red blossom that grows from the end of a bunch of bananas and it is a leafy maroon-colored cone with cream-colored florets layered inside. Plantain flower is usually considered as a by-product of banana cultivation. Plantain flower is rich in phytochemical and also a good antioxidant source. The plantain flower is a substantial source of anticancer, antidiabetic, antibacterial, anthelmintic, antiulcer, and anti-HIV activity. Dried plantain flower powder was prepared by using the sundry method. The main objective of this present study was designed to formulate and develop the plantain flower poli by incorporating dried plantain flower powder at three level of variation 10%, 20%, and 30%. Besides, the phytochemical and antioxidant properties of dried plantain flower powder were estimated. Plantain flower Poli was developed and sensory evaluation was done with the help of a 5-point hedonic rating scale in terms of color, texture, appearance, taste, and overall acceptability by 30panelists (neighbourhood). According to this benefit, it helps to improve the nutritional status. Based on the result, it revealed that plantain flower poli developed with 20% of dried plantain flower powder was highly acceptable by 30 panelists. Finally, the products developed by using dried plantain flower powder can be effective for anemic conditions, protein malnutrition conditions, heart and diabetic patients for better improvement.

Keywords: Plantain flower, antidiabetic, phytochemical, antioxidant, dried plantain flower powder

Introduction
The Plantain flower is a large, dark purple-reddish blossom that grows from the end of a bunch of bananas. Plantain flower is usually considered as a by-product of banana cultivation [1]. Plantain flower (Musa acuminate) is rich in antioxidant properties that prevent free radicals and control tissue damage and may prevent cardiovascular diseases by inhibiting the oxidative process in cholesterols [2]. Plantain flower is rich in phytochemicals and represents a valuable source of potassium, vitamin A, vitamin C, vitamin E, fatty acid content, saponin, essential and non-essential amino acid, tannins, glycoside, and steroid [3]. Besides the high number of antioxidants, the plantain flower contains a good source of minerals such as magnesium (48.7mg/100gms), iron (56.4mg/100gm), and copper (13mg/100gm). The magnesium in plantain flower act as a natural anti-depressant and thereby it will help to reduce mood swings and depression [4]. The research found that plantain flower contains abundant dietary fiber (5.74g/100g) which helps to maintain the body health, to reduce the cholesterol level, and protect the body from obesity [5]. The plantain flower has been used in traditional medicine to treat bronchitis, constipation, dysentery, stomach ulcers, and throat ulcer. It can cure inflammation of eyes and eye afflictions [6]. Plantain flower is often consumed as a vegetable and deep-fried salad with rice and Wheat bread in many Asian countries such as India, Sri Lanka, Malaysia, Indonesia, and the Philippines and also used as a food additive in the food industry. The plantain flower is used in cooking as a soup, dip fried, cutlet, etc., in Southeast Asian, Indian, and Bengali [7]. Plantain flower can be used in dehydrated form thereby it is easily incorporated into food formulation [8]. The 100g of plantain flower, contains 51 kcal of energy, 1.6g of protein,0.6g of Fat, 9.9g Carbohydrate, 5.7gof Fiber, 56mg of Calcium, 73.3mg of Phosphorous,553.3 mg of Potassium, 34mg of Vitamin-E and it also contains137mg of flavonoids especially quercetin [9].

Objectives

The main objective of this study "Formulation and Development of Poli incorporated with Dried Plantain Flower Powder"

- To formulate and develop food recipe using plantain Flower and Florets powder.
- To analyses the phytochemical & antioxidant properties of plantain Flower and Florets powder.
- To analyses the Shelf life for Plantain flower and Florets powder.
- To standardize the incorporated plantain Flowers and Florets powder recipe.
- To analyses the organoleptic evaluation of food recipe.

Materials and Methods

Dried Plantain flower powder was prepared by using the traditional method (Sundry)

The fresh Plantain flower was obtained as raw material. Organic and good quality Plantain flower were collected from the local market in Tirupur, Tamil Nadu. Qualities of the plantain flower were selected according to the size, heaviness, firm one with tightly packed petals and finely textured with purplish-red in color. Plantain flower which is wilted off or decayed were rejected.

Fresh Plantain flower was washed in soft water to get rid of the dust and dirt present on the surface of Plantain flower. After washing the Plantain flower, bracts were peeled and removed the florets until the leaves become too small to peel where the stem was trimmed and discarded. The thin stick in the center called pistils should be removed. Finely chopped them into pieces and sun drying should be done by covering using the white muslin cloth for 5-7 days. Finally, Dried Plantain flower were brittle and dry which is the best indicator to grind and make into powder and can be stored for long periods on the shelf.

Standardization of Poli by using dried plantain flower powder

The Poli is formulated by using dried plantain flower powder, Maida flour, oil, salt, water, Bengal gram dhal, and jaggery. The Poli are incorporated in three variations as V1, V2, V3 by keeping the proportions of dried plantain flower powder (10%, 20%/ and 30%) and Maida flour (90%, 80%, and 70%) and shown in table 1. Plate 1 shows that prepared standardization of poli by using dried plantain flower powder.

Table 1: Standardization of poli by using dried plantain flower powder

S.NO	Ingredients	V1	V2	V3
1	Dried plantain flower powder	10	20	30
2	Maida flour	90	80	70

Plate 1: Standardization of poli by using dried plantain flower powder

Organoleptic evaluation

Food product development is a complex process that requires knowledge of ingredients, processing techniques, packaging materials, regulation, Consumer demands, and preferences. The food product will be formulated and standardized by incorporating the dried plantain flower powder at various proportions. The formulated Plantain flower Poli is presented to a 30 panelist with a 5-point hedonic scale in which includes color, appearance, texture, taste, and overall acceptability.

Statistical analysis of the product

The plantain flower Poli is attributed to statistical tools such as mean and standard deviation. T-test and ANOVA test were done on plantain flower poli by using SPSS software.

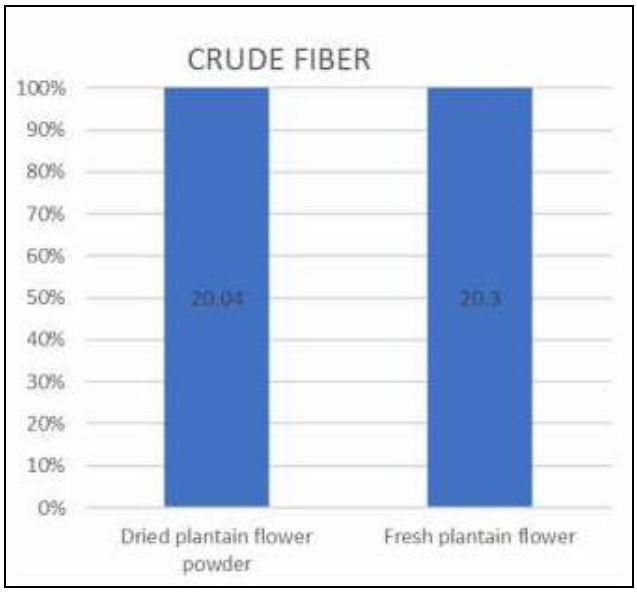
Result and Discussions

Nutritional Analysis

Plantain flower is a good source of crude fibre in the human diet. The main health benefit of crude fibre is that it facilitates regular bowel movement. Crude fibre is rich in Leafy greens, whole grains, and beans (black beans) [10]. Table 2 crude shows fibre content in dried plantain flower powder [DPFP] and Fresh plantain flower [FPF].

Table 2: Fibre content in DPFP & FPF

Parameter	Dried plantain flower powder	Fresh plantain flower
Crude Fiber	20.04	20.31



Graph 1: Crude Fiber content in DPFP and FPF

Comparatively, the estimated crude fiber in dried plantain flower powder and fresh plantain flower are the same. Even though dehydrate the plantain flower into powder, the fiber will remain similar as fresh so it can benefit in treating constipation, hemorrhoids, diverticulosis, coronary heart diseases, and some type of cancer

Proximal Analysis of Plantain Flower Poli

Nutrient composition of variation-2 was analyzed for the essential nutrients such as energy, carbohydrate, fat, protein, fiber, and iron. The results were displayed in the Table below.

Table 3: Shows Nutrient content of Plantain flower Poli (per 100g)

S.No	Criteria	Nutritive Value/100g
1	Energy (Kcal)	634.53 Kcal
2	Carbohydrate (g)	127.85g
3	Protein (g)	20.33g
4	Fat (g)	3.49g
5	Fiber(g)	31g
6	Iron(mg)	56.52mg

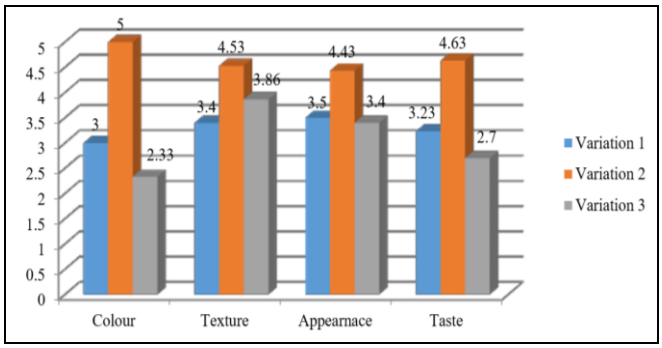
Mean Organoleptic evaluation

Table 4 shows the mean score for an organoleptic evaluation of Plantain Flower Poli such as color, texture, appearance, taste, and overall acceptability obtained by three variations.

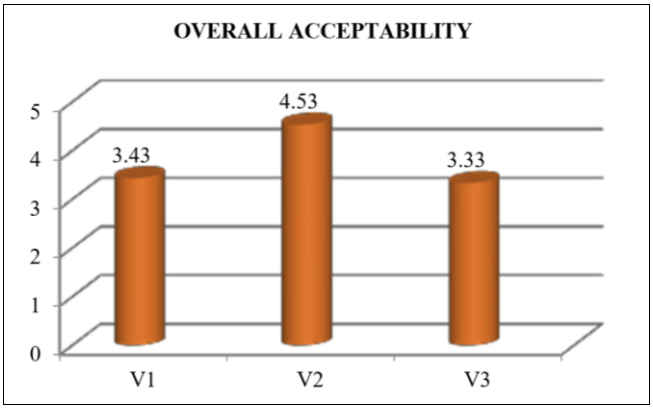
Table 4: Mean organoleptic score of plantain flower poli

S. No	Criteria	Mean Scores of Variations		
		V1	V2	V3
1	Color	3±0	5±0	2.33±0.75
2	Texture	3.4±0.56	4.53±0.50	3.86±0.50
3	Appearance	3.5±0.57	4.43±0.50	3.4±0.49
4	Taste	3.23±0.43	4.63±0.49	2.7±0.83
5	Overall Acceptability	3.43±3.44	4.53±0.50	3.33±0.66

Plantain flower Poli reveals that 20% of variation 2 has a maximum score obtained by organoleptic characteristics of color, taste, appearance, texture, and overall acceptability when compared to the other two variations. Hence when compared to other variations, variation 2 which has 20% of poli was accepted overall and obtained a maximum score. The graphical representation revealed the graphical representation organoleptic evaluation of Plantain Flower Poli in three variations (V1, V2, V3).



Graph 2: Mean organoleptic scores of plantain flower poli



Graph 3: Overall Acceptability of Poli

Conclusion

The newly developed product focus on the nutritional, ant carcinogenic & antioxidant properties of plantain flower which can be used for food, pharmaceuticals, and many other industrial uses. Plantain flower represent an excellent source of antioxidant properties because of the availability of Vitamin E and quercetin. The future nutritionist should insist on particular efforts by incorporating the plantain flower into a regular diet and spread awareness among the community.

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