

Nutritional Assessment of Hibiscus rosa sinensis Flower, Formulation and Popularization of Hibiscus Flower based Products

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Abstract

Medicinal plants have been used in virtually all cultures as a source of medicine, since times immemorial. *Hibiscus rosa sinensis* Linn. (Family Malvaceae) is a plant which is widely distributed throughout the world. Pharmacological studies showed that flowers of *H. rosa sinensis* have numerous actions including antibacterial, wound healing, antidepressant, cardiac and antioxidant effects. This study aimed to estimate the nutritional value, phytochemical and physicochemical properties and microbial counts of hibiscus flowers (both fresh and dry). The result showed that the nutrient contents of hibiscus dry powder was higher than the hibiscus syrup. The chemical constituents present in the methanol and 50% aqueous – alcoholic extracts of fresh and dried hibiscus flower were alkaloids, glycosides, carbohydrates, phytosterols, polyphenols, tannins, saponins, flavonoids and proteins and amino acids and the constituents steroids, terpenoids and triterpenoids were absent. The physico-chemical parameters like total ash, acid insoluble ash, water soluble ash and sulphated ash were found to be high in dried flowers than fresh flowers. The bacterial count of hibiscus flower powder indicates that the sample stored in the ziplock polypack was minimum than in the plastic container and the yeast and mould count indicates that the sample stored in the plastic container was minimum than in the ziplock polypack. The hibiscus syrup and powder based products were also developed to create nutritional awareness among the adolescent girls.

Keywords: Bacterial Count, Chemical Constituents, *Hibiscus rosa sinensis*, Nutrient Contents, Nutritional Awareness

1. Introduction

The *Hibiscus rosa sinensis*, a highly potential, functional and valuable medicinal plant, has been reported in the ancient medicinal literature with beneficial effects in various disorders of humans¹. *Hibiscus rosa sinensis* flowers are reported to contain quercetin, anthocyanins, flavonoids, cyclopeptide alkaloid and vitamins². They possess anti-tumor, anti-fertility effect, analgesic, anti-pyretic, anti-inflammatory, anti-viral, anti-diabetic and hypoglycemic activities³.

The hibiscus flower is extensively mentioned in Ayurveda and siddha systems and continue to be a

prominent herbal remedy of indigenous practices across the world to treat hair fall, piles, hemorrhage, menorrhagia, leucorrhoea, dysuria, hypertension, cough, diseases of pitta and as emmenagogue, abortifacient and contraceptive⁴.

An infusion of the petal is widely used in Ayurvedic medicine in India as a demulcent refrigerant drink in fever⁵.

2. Materials and Methods

Hibiscus rosa sinensis is a conspicuous, perennial, ornamental shrub, red in colour, 4–6 inches in diameter.

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The petals are thin and slightly crinkly and look like tissue paper and its corolla consists of 5 petals⁶. The hibiscus flowers needed for the present study were collected from the surroundings. The flowers were selected carefully without any damage or insect infestation for processing.

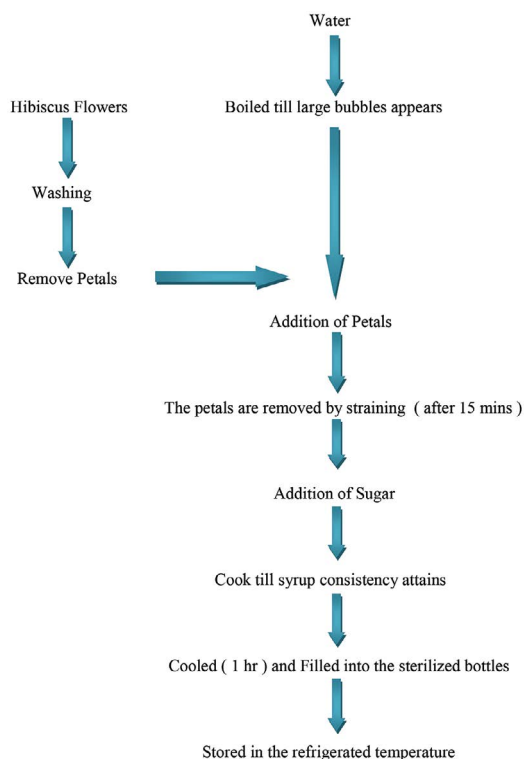


Figure 1. Preparation of hibiscus syrup.

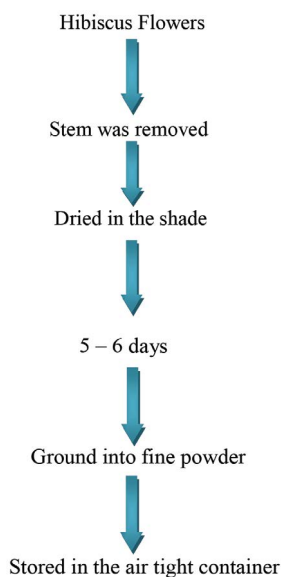


Figure 2. Preparation of hibiscus powder.

2.1 Analysis of Nutritive Value

In the present study, the nutritive value of both syrup and the dry powder made from the hibiscus flower such as Calories, Proteins, Fat, Fibre, Vitamin-A, Vitamin-C, Sodium, Phosphorus, Potassium, Iron and Calcium were analyzed quantitatively.

2.2 Analysis of Chemical Constituents

The medicinal value of a plant depends on the nature of the chemical constituents present. The chemical constituents which is responsible for the therapeutic effect is called as the active principle⁷. In the present study, some of the chemical constituents such as Tannins, flavonoids, triterpenoids, polyphenols, alkaloids, anthocyanins and saponins were analyzed in both the fresh and dry hibiscus flowers.

2.3 Analysis of Physicochemical Parameters

The quantitative analysis of the physicochemical parameters such as moisture, total ash, acid insoluble ash, water soluble ash, sulphated ash, swelling index and foaming index were determined in the fresh and dry hibiscus flowers.

2.4 Formulation of Products

Many food products are made by combining raw materials in specific proportions in a formulation and research on the effects of various formulations on product qualities is common in product design.

The products such as rasgulla, gulab jamun and lemonade were prepared by using hibiscus syrup and products like Podi (mix), pudding and milkshake were prepared by using dry hibiscus powder. The formulated recipes were organoleptically evaluated to estimate their acceptability using 5 points Hedonic Scale.

2.5 Popularization of Formulated Products

The nutritional awareness was conveyed through lecture method, with the help of teaching aids. Pamphlets, booklets and power point presentation were prepared and used to give counseling for 30 adolescent girls selected for the study in Vellalar College for Women, Thindal, Erode.

2.6 Assessment of Storage Stability

The microbial count namely TBC (Total Bacterial Count), Total yeast and mould count in the dried hibiscus

powder was evaluated initially, 15th day and 30th days of storage.

3. Results and Discussion

3.1 Nutrient Content of Hibiscus rosa sinensis Syrup and Powder

There was a wide range of difference in the nutritive values of energy, carbohydrates, fibre and calcium contents between the syrup and powder. The nutrient contents of hibiscus dry powder was found to be high than the nutrient content of hibiscus syrup.

3.2. Comparison of Nutrient Content of Formulated Products

The nutrient content of all the formulated products were analyzed and discussed in this study. Table 2 depicts the products based on the decreasing trend of nutrients.

This table revealed that among all the products mix (podi) made from hibiscus powder was found to be rich in most of the nutrients and the lemonade (sherbat) made from syrup was found to be the least in all nutritive values.

3.3 Chemical Constituents in Fresh and Dry Hibiscus Flowers

Table 1. Nutrient content of hibiscus syrup and dry powder (100 g)

S.No	NUTRIENTS	UNITS	SYRUP	POWDER
1	Energy	K.Cal	159.2	353
2	Carbohydrates	g	39.76	86.3
3	Proteins	g	0.052	3.9
4	Fat	g	0.08	3.9
5	Fibre	g	0.312	15.7
6	Calcium	mg	5.6	39
7	Phosphorus	mg	5.8	265
8	Iron	mg	0.402	1.7
9	Vit - C	mg	0.84	3.9

Table 2. Comparison of nutrient content of formulated products

S.No	Nutrients	Sequence of the Products					
		I	II	III	IV	V	VI
1	Energy	GJ	MX	MS	PUD	RAS	LEM
2	Carbohydrates	MX	MS	PUD	GJ	RAS	LEM
3	Proteins	MX	PUD	RAS	GJ	MS	LEM
4	Fat	GJ	MX	PUD	RAS	MS	LEM
5	Fibre	MX	PUD	MS	GJ	RAS	LEM
6	Calcium	MX	RAS	PUD	MS	GJ	LEM
7	Phosphorus	MX	PUD	MS	RAS	GJ	LEM
8	Iron	MX	GJ	RAS	PUD	LEM	MS
9	Carotene	MX	RAS	PUD	MS	GJ	LEM (NO)
10	Vit - C	MX	RAS	PUD	GJ	LEM	MS

RAS – Rasgulla GJ – Gulab Jamun LEM – Lemonade

MX – Mix PUD – Pudding MS - Milkshake

The chemical constituents (phytochemicals) were

analyzed in both fresh and dry *Hibiscus rosa sinensis* flowers. Chemical tests are conducted on the methanolic extract and also 50% aqueous–alcoholic extract of the powdered form of the samples using standard methods.

The methanol extract of hibiscus flower contain varied type of phytochemical compounds which include, alkaloids, glycosides, carbohydrates, phytosterols, polyphenols, tannins, saponins, flavonoids and proteins and amino acids. The 50% aqueous–alcoholic extract of hibiscus flower contain carbohydrates, phytosterols, flavonoids, saponins, polyphenols, proteins and aminoacids.

Steroids, terpenoids and triterpenoids were absent in both the methanol and 50% aqueous – alcoholic extract of fresh and dried hibiscus flowers.

3.4 Physico Chemical Parameters in Fresh and Dry Hibiscus Flowers

The physicochemical properties such as total ash, acid insoluble ash, water insoluble ash, sulphated ash, water soluble extractive value, alcohol soluble extractive value, moisture content, swelling index and foaming index were determined in both the fresh and dry *Hibiscus rosa sinensis* flowers.

The total ash content of dry flower was higher than

fresh flowers. Acid insoluble and water insoluble contents and also the sulphated ash value of both fresh and dried flowers were found to be more or less similar. Water insoluble extractive value and Alcohol soluble extractive value of fresh flowers were slightly higher than that of dry flowers. Swelling index and foaming index of both fresh and dry flowers were also found to be the same.

3.5 Storage Stability of Dry Hibiscus Powder

The flower extracts had stronger antibacterial effects than that of leaves at the applied doses of 50 and 100 mg and raises the possibility of using the extracts as antimicrobial agents in treating pathological conditions caused by *S. aureus* and *S. typhimurium* infection⁸.

3.5.1 Bacterial Count

The above table showed that there was slight increase in the bacterial count during storage which may be due to the improper storage of the sample. The sample stored in the ziplock polypack shows reduced bacterial growth than stored in the plastic container.

3.5.2 Yeast and Mould Count

The above table showed that there was a slight increase in the total yeast and mould count of the sample stored in

Table 3. Phytochemical analysis of fresh and dry HRS flowers

S.No	Test For	Methanol Extract		50% Aqueous–Alcoholic Extract	
		Fresh	Dried	Fresh	Dried
1	Alkaloids	+	+	-	-
2	Glycosides	+	+	-	-
3	Carbohydrates	+	+	+	+
4	Phytosterols	+	+	+	+
5	Steroids	-	-	-	-
6	Flavonoids	+	+	+	+
7	Saponins	+	+	+	+
8	Polyphenols	+	+	+	+
9	Tannins	+	+	-	-
10	Proteins and Amino acids	+	+	+	+
11	Terpenoids	-	-	-	-
12	Triterpenoids	-	-	-	-

HRS – *Hibiscus rosa sinensis*

the container and in ziplock polypack. The sample stored in the plastic container shows reduced yeast and mould growth than stored in the ziplock polypack.

3.6 opularization of Hibiscus Flower Based Products

The formulated products using hibiscus flowers were popularized among the selected subjects. The nutritional awareness was also created to all the subjects. A questionnaire was given to these subjects before and after the nutrition education and the nutritional knowledge of the subjects were determined.

Table 4. Extractive and ash values of fresh and dry HRS flowers

S.No	Parameters	Values % (W/W)	
		Fresh Flowers	Dried Flowers
1	Total Ash	8.3%	8.5%
2	Acid Insoluble Ash	0.11%	0.13%
3	Water Insoluble Ash	5.36%	5.39%
4	Sulphated Ash	0.20%	0.19%
5	Water Soluble Extractive Value	22.1%	21.8%
6	Alcohol Soluble Extractive Value	6.5%	6.2%
7	Loss on Drying / Moisture Content	5.45%	5.26%

HRS – *Hibiscus rosa sinensis*

Table 5. Bacterial count of hibiscus flower powder

S.No	Sample Name	Total Bacterial Count (cfu / g)		
		Initial Day	15th Day	30th Day
1	Hibiscus (C)	1.4×10^3	2.9×10^3	3.7×10^3
2	Hibiscus (Z)	1.2×10^3	2.6×10^3	3.3×10^3

(C) – Container (Z) – Ziplock Polypack

Table 6. Yeast and mould count of hibiscus flower powder

S.No	Sample Name	Total Yeast and Mould Count (cfu / g)		
		Initial Day	15th Day	30th Day
1	Hibiscus (C)	1.1×10^4	1.9×10^4	2.7×10^4
2	Hibiscus (Z)	1.2×10^4	2.1×10^4	2.9×10^4

(C) – Container (Z) – Ziplock Polypack

Table 7. Evaluation of nutritional knowledge on hibiscus flowers

N = 30

S.No	Grades	Knowledge Scores On Hibiscus Flowers			
		Before Education		After Education	
		No	Percent (%)	No	Percent(%)
1	1 – 10	22	73	---	---
2	11 – 20	8	27	5	17
3	21 - 30	---	---	25	83

The above table revealed that the nutrition education about the importance of hibiscus flowers had created a great impact among the selected subjects.

4. Conclusion

Hence the present study concluded that the hibiscus flowers were rich in many phytochemicals and it can be used to treat various disease conditions. Among the hibiscus flower based formulated products the Mix (podi) was rich in most of the nutrients than that of other products. The nutrition education and popularization of the products using hibiscus flower in the form of syrup and powder proved effective in improving the nutritional knowledge of the subjects. The storage stability of dry hibiscus powder shows limited bacterial and yeast and mould counts and hence it can be stored for 30 days.

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