

# Nutritional Evaluation of Dehydrated Stems Powder of Cauliflower Incorporated in Mathri and Sev

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## Abstract

Cauliflower is a tropical crop of India and China in the family Brassicaceae. Typically, only the head is eaten, while the stalk and surrounding thick green leaves are discarded. Whereas, its leaves which are generally thrown away as waste are also rich source of iron and  $\beta$ -carotene and thus can be utilized in various value added products. The present study was conducted on "Nutritional evaluation of dehydrated stems powder of cauliflower incorporated in mathri and sev". In the present study dehydrated cauliflower stems powder was incorporated in different ratios in sev and mathri (5 g, 10 g, 15 g) respectively. Panels of 10 members were selected through triangle test for the sensory evaluation of the incorporated recipes. 9 point Hedonic Rating Scale and Composite scoring test was used for the evaluation. Data obtained during investigation were statistically analyzed using ANOVA, CD and t-test. The nutrient calculations showed a good increase in calcium and iron with the incorporation of dehydrated cauliflower stems powder as compare to standard recipes. It was concluded that dehydrated powder of cauliflower stems could be successfully incorporated in recipes to improve their nutritional content.

**Keywords:** Dehydrated; Organoleptic; Incorporated; Scoring

## Introduction

In India leafy vegetables or greens from many plants have been used in the diet from ancient time. They are nutritionally very and rich in vitamins and minerals. Vegetables are highly seasonal and are usually and are usually available in plenty of human diet. They are plants or part of plants that are used as foods. Vegetables are important in improving the acceptability of meal, because of the innumerable shades of colour, flavour and texture they contribute [1-5]. Vegetables as a whole are considered natural sources of nutrients gifted by nature to human beings. Vegetables are important sources of food and are highly beneficial for health. Cauliflower is low in calories, high in dietary fiber, folate, water and vitamin C possessing a high nutritional density. A high intake of cauliflower has been associated with reduced risk of aggressive prostate cancer.

The main component of the cauliflower is water and it has a low content of carbohydrates, proteins and fats. However, it is considered a good source of dietary fibre, vitamin B6, folic acid, vitamin B5, and small amount of other B group vitamins and minerals especially potassium and phosphorous. Cauliflower contains important phytochemicals with its bioactive compounds, glucosinolates and indole-3-carbinol, cauliflower shows great promise in providing substantial protection against cardiovascular disease, cancer and diabetes. Higher waste to edible ratio and high value of vegetable makes cauliflower one of the best candidates for minimally process ready to cook (RTC) vegetables. Almost 70-80% of the cauliflower waste (stems and leaves) is reported to have a good nutritive value with respect to proximate composition, digestive crude protein, total digestible nutrient, starch equivalent content and amino acids, due to its high nutritive value it can be used as a cereal supplement [6,7]. Cauliflower has the highest waste index, i.e. ratio of non-edible to edible portion after harvesting [6], and thus generates a large amount of organic solid waste, which creates a foul odour on decomposition. It is considered as a rich source of dietary fiber and it possesses both antioxidant and anticarcinogenic properties. Disposal of the non-edible portion of cauliflower (cauliflower waste), which contributes to about 45-60% of the total weight of the vegetable, remains a crucial problem [8]. Unfortunately, cauliflower waste in developing countries like India does not find any significant commercial

use, despite containing appreciable amount of proteins and minerals. There is very scanty literature available on the use of vegetable residues, especially cauliflower waste for enzyme production [9].

## Objectives

Incorporation of dehydrated cauliflower stems may be beneficial in human diet as it is a good source of nutrients. The research work had following objectives:

1. To analyse the chemical composition of fresh and dehydrated cauliflower stems powder.
2. To prepare the value added recipes using dehydrated selected vegetables.
3. To assess the organoleptic attributes of the prepared food products.
4. To determine the nutritional value of the prepared products.

## Materials and Methods

The methodological aspects of the study were discussed under the following heads:

### Procurement of raw materials

(a) **Procurement of raw cauliflower stems:** The raw materials for the product development were collected from the Women's Hostel kitchen of SHUATS.

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(b) **Dehydration of stems and preparation of powder:** Stems were cleaned & washed with water [10-11].

Kitchen waste

(Cabbage outer leaves and stems)

Washing

Blanching for 3 min with water containing 2% salt & 10% citric acid

Drain out with excess water

Spreading on flat aluminium tray

Tray drying at 60° - 65° for 15 hours

Dehydration till the moisture become 6-8 %

Grinding into powder

Storage (At ambience temperature in dry place)

### Development of food products

Two food products (Sev and mathri) were prepared with cauliflower dehydrated powder. For each product, the basic recipe (control T<sub>0</sub>) had three variations, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> respectively, where the amount of one or more ingredients was varied.

(a) **Details of treatments prepared from dehydrated cauliflower stems powder:** Three variations at different %age (5 g, 10 g, and 15 g in sev and mathri) of each recipe incorporated with dehydrated cauliflower stems powder were prepared. The basic recipe was prepared as standard for sensory evaluation.

### Nutritional composition of fresh and dehydrated powder of cauliflower

Proximate analysis- Chemical estimation of moisture, ash, protein, fat, fiber and carbohydrate, mineral content was done by using standard procedures [2].

### Sensory evaluation

Sensory evaluation of the food products for their acceptability was done by a panel of 5 judges. The score card based on the 9 point Hedonic Scale was used for sensory evaluation on the basis of evaluation of attributes like Colour and Appearance, Body and Texture, Taste & Flavour and Overall Acceptability [10].

### Statistical analysis

Analysis of variance technique (ANOVA), Critical Difference and t-test were used to analyse the data [4].

### Determination of nutritive value

The nutritional value obtained by the chemical analysis of the fresh and dehydrated stems and leaves will be computed as well as food composition tables by [3] will be used to determine the nutritive value of the product prepared.

### Result and Discussion

The chemical composition of fresh and dehydrated cauliflower stems is listed in Table 1, namely moisture, protein, ether extract (fat), ash, dietary fibers and carbohydrates. Cauliflower powder is considered as a good source of protein, minerals and crude fiber. Therefore it should be utilized for the value addition of food products. Cauliflower stems powder contains moisture 8.9%, ash 4.5%, protein 17.02 g, carbohydrates 51.58 g and dietary fiber 16.02 g respectively. This data obtained is in accordance with those obtained by (Figure 1) [1,9,12,13].

Table 2 shows the results of sensory evaluation done by selected panel members. Sensory evaluation of “mathri” with and without incorporation of fresh grated cauliflower stems and dehydrated cauliflower stem powder showed that the overall acceptability was highest in T<sub>1</sub> (8.5) followed by T<sub>0</sub> (8.3), T<sub>2</sub> (7.7) and T<sub>3</sub> (7.0) and for dehydrated cauliflower mathri T<sub>1</sub> (8.6) followed by T<sub>0</sub> (8.4), T<sub>2</sub> (7.5) and T<sub>3</sub> (6.4) respectively and there was a significant difference, (P<0.05) between the control and treatments. The overall acceptability of T<sub>1</sub> was significantly better than control (T<sub>0</sub>) (Figure 2).

Nutrients	Fresh cauliflower stem	Dehydrated cauliflower stems powder
Moisture %	88.76	8.9
Ash (g)	0.9 g	4.56
Protein (g)	1.8 g	17.02
Fat (g)	0.2 g	1.9
Carbohydrate (g)	5.94 g	51.56
Iron (mg)	0.8 µg	17.59
Total carotene (mg)	41.40 µg	414
Dietary fiber (g)	2.4 g	16.02

Table 1: The chemical composition of fresh cauliflower stem and dehydrated cauliflower stems powder per 100 g.

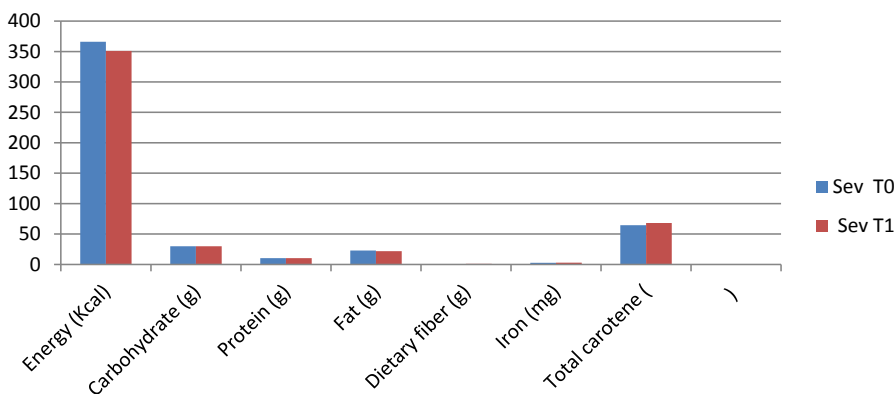


Figure 1: Shows nutrient content of sev standard and incorporated recipe.

Parameters	Sev T <sub>0</sub> Mean ± SE	Sev T <sub>1</sub> Mean ± SE	Mathri T <sub>0</sub> Mean ± SE	Mathri T <sub>1</sub> Mean ± SE	Result
Colour and appearance	8.0 ± 0.08	8.4 ± 0.12	8.2 ± 0.08	8.7 ± 0.12	S
Body and texture	8.3 ± 0.07	8.6 ± 0.04	8.6 ± 0.08	8.6 ± 0.08	S
Taste and flavour	8.3 ± 0.07	8.4 ± 0.04	8.4 ± 0.08	8.5 ± 0.12	S
Overall acceptability	8.2 ± 0.16	8.4 ± 0.09	8.4 ± 0.12	8.6 ± 0.11	S

Table 2: Average sensory score of different parameters in control and treated sample of dehydrated cauliflower stems powder “Sev” and ‘Mathri’.

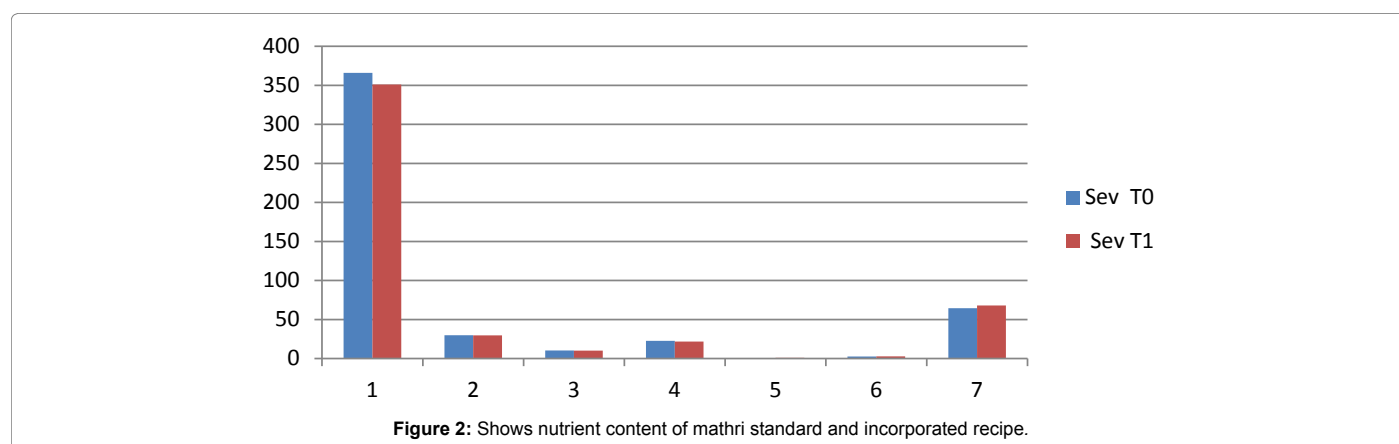


Figure 2: Shows nutrient content of mathri standard and incorporated recipe.

Parameters	Mathri		Sev	
	Control	Treatment	Control	Treatment
Nutrients	Mathri T <sub>0</sub>	Mathri T <sub>1</sub>	Sev T <sub>0</sub>	Sev T <sub>1</sub>
Energy (Kcal)	354	340	366	351
Carbohydrate (g)	37	35.24	30	29.79
Protein (g)	5.5	5.61	10.4	10.30
Fat (g)	20.45	19.49	22.8	21.75
Dietary fiber (g)	0.15	0.66	0.6	0.95
Iron (mg)	1.35	1.55	2.65	2.85
Total carotene (µg)	12.5	25.57	64.5	68.04

Table 3: Average nutrients content in control and treated sample of ‘mathri’ and ‘sev’ with dehydrated cauliflower stems powder.

Sensory evaluation of “sev” with and without incorporation of fresh grated cauliflower stems and dehydrated cauliflower stem powder showed that the overall acceptability was highest in T<sub>1</sub> (8.5) followed by T<sub>0</sub> (8.3), T<sub>2</sub> (7.5) and T<sub>3</sub> (6.6) and for dehydrated cauliflower sev T<sub>1</sub> (8.4) followed by T<sub>0</sub> (8.2), T<sub>2</sub> (7.4) and T<sub>3</sub> (6.5) respectively and there was a significant difference, (P<0.05) between the control and treatments. The overall acceptability of T<sub>1</sub> was significantly better than control (T<sub>0</sub>).

Table 3 shows the nutrient content of the recipes with reference to control and selected treatment recipe. In mathri range of nutrient for protein was between 5.5-6.0 g, carbohydrates were ranged between 35-38 g, dietary fiber were ranged from 0.15-0.66 and iron ranged between 1.35-1.55 mg. In sev the nutrient content for protein was between 10.3-10.4 g, carbohydrates were ranged between 29-30 g, dietary fiber were ranged between 0.6-1 g and for iron it was from 2.65-2.86 mg.

## Conclusions

The present results are recommended with that it should be directed towards the utilization of cauliflower stems (by products) powder in the production of value added food products as it is a good and inexpensive source of protein, minerals and dietary fibers.

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