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Studies on preparation of green leafy vegetable based traditional foods and their nutritional evaluation

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Abstract

The different preparations were prepared from green leafy vegetables such as *Rye katlu, Rye patroda, Rye sag, Palak matar, Methi sag, Sarson sag, Chunali sag* and *Dhura sag* by employing traditional methods. These preparations were also subjected to nutritional evaluation. Maximum crude protein 10.77g/100g was observed in *Rye patroda*, whereas, fat content (12.81g/100g) was found to be higher in *Dhura sag*. Carbohydrate and energy content was assessed to be 26.75g/100g and 216 Kcal, respectively in *rye katlu. Rye sag* contained the maximum amount of calcium (3200mg/100g) and β-carotene content (3478µg/100g) while iron (20.46 mg/100g) and vitamin C (17.50mg/100g) content was observed to be higher in *methi sag*.

Key words: Nutrient composition, vitamin, minerals, traditional preparations.

Introduction

India has made a great progress in vegetable production during the last few decades, securing the second largest position in vegetable production in the world (Dhankhar and Bhatia, 2003). Vegetables are also a cheaper source of protective nutrients such as vitamins and minerals. Carotene, a precursor of vitamin A, is present in higher amounts in green leafy vegetables. Major mineral elements such as calcium, iron and phosphorus are present in appreciable amounts in most of the green leafy vegetables. Darker the leaves, more nutrient content the vegetables have. The vegetables provide roughages in the form of dietary fibres, which help in digestion and bowel movement.Leafy vegetables contain a high proportion of cellulose and intestinal juices so the consumption of leafy vegetables in any form is helpful in weight reduction as they provide bulk and give a feeling of satiety but provide few calories (Sharma *et al.*, 2007). These vegetables also play a key role in neutralizing the acid produced during the digestion of proteins and fatty foods. Although dietary habits of population in different regions of the world vary widely depending upon the local availability of foods but when it comes to the nutritional contents of foods, it should be related to cooked foods that reach the table. However, cooking practices vary from one region to another in the country and even from one household to another. So keeping in view the importance of these traditional products based on green leafy vegetables in our routine diet, the present study was conducted to prepare different value added products from green leafy vegetables using traditional methods and to analyze the nutrient composition of these products.

Material and Methods

Information regarding the common vegetables and fruits based preparations; their method of preparation and ingredients used was collected from the housewives of the rural areas of the Kangra District of Himachal Pradesh. On the basis of collected information different preparations based on locally available vegetables were selected and prepared in the laboratory. The different observations recorded include weight of raw ingredients, weight and volume of cooked food. Different cooked preparations were dried, powdered and stored in airtight containers for further analysis on dry weight basis or wet weight basis.

Various vegetables like green leafy vegetables as well as other ingredients used in different preparations were procured from the local market. Commonly and frequently consumed regional recipes were prepared and standardized in the laboratory and then analyzed for their chemical contents.

Nutritional evaluation of different preparations

The moisture content in vegetable preparations was estimated by AOAC (1995) using method on fresh matter basis prepared products were dried, homogenized and analyzed for their proximate composition on as is basis by using standard method (AOAC, 1995). Calcium and iron were determined by using atomic absorption spectrophotometer (Piper, 1950). Carbohydrate content was calculated by multiplication method from protein, fat and carbohydrate content. The

method given by Rao (1967) and AOAC (1995) were used to determine the β-carotene and ascorbic acid, respectively. The organoleptic evaluation of the prepared products based on green leafy vegetables was done by using 10 point Hedonic scale

Methodology for recipes preparation

1 *Rye katlu*

Ingredients used	**Quantity**
Rye leaves	800g
Bengal gram flour	200g
Salt	according to taste
Chillies powder	1 g
Garam masala	2g
Turmeric powder	2g
Cumin seeds	1g
Oil used for frying	60 ml.
Water	110 ml

Method: Wash fresh rye leaves were washed and cut finely. Mix leaves with sieved Bengal gram flour. Add spices and mix well. Knead the mixture by adding water. Convert the mixture into small balls, flatten and cook on both sides on hot greased *tawa.*

Weight of cooked preparation 600g

2 *Rye Patroda*

Ingredients used	**Quantity**
Rye leaves	800g
Bengal gram flour	200g
Salt	according to taste
Red chillies	1 g
Garam masala	1g
Turmeric powder	1g
Cumin seeds	1g
Oil added to batter	5 ml
Oil for frying	100 ml
Water	50 ml

Method: Wash rye leaves. Sieve Bengal gram flour. Add spices and oil in it and make batter using water. Spread rye leaf. Apply batter on one side of the whole leaf. Then place another leaf on it and again apply batter on it. In this way place 6-7 leaves one upon another applying batter in between the leaves. Then roll all leaves together and tie the roll with a thread. Add little oil in a small pan. Put rolls in it and cook covered till soft and crispy.

Weight of cooked preparation 650g

3 *Rye Sag*

Ingredients used	**Quantity**
Rye leaves	1 kg
Onion	50g
Garlic	5g
Ginger	5g
Coriander powder	1g
Fenugreek seeds	1g
Salt	according to taste
Red chillies	0.5g
Turmeric powder	1g
Oil	45 ml

Method: Clean, wash and cut rye leaves. Add salt and pressure cook for 15-20 min. Heat oil in a skillet. Add oil and fry chopped ginger, garlic and onion till light brown. Add spices and cooked leaves and cook till water is completely evaporated.

Weight of cooked preparation 850g

4 *Dhura Sag*

Ingredients used	**Quantity**
Dhurae leaves	1kg
Onion	50g
Garlic	5g
Ginger	10g
Chillies	1g
Oil	15 ml
Salt	according to taste
Lemon juice	60 ml

Method: Wash *dhurae* leaves and boil in approximately 200ml water. Heat oil and fry chopped onion, ginger and garlic till light brown. Add spices and boiled dhura leaves and citrus juice and cook for 5-7minutes.

Weight of cooked preparation 1kg.

5 *Palak Matar*

Ingredients used	**Quantity**
Spinach (palak)	800g
Peas	200g
Onion	20g
Ginger	10g
Garlic	5g
Chillies	1g
Turmeric powder	1g
Coriander powder	2g
Garam masala	1g
Oil	25 ml
Salt	according to taste

Method: Wash, cut and pressure cook spinach, mash spinach with a ladle or in a mixer.Heat oil in a pan. Add chopped onion, ginger and cook till light brown. Add spices and peas. Cover with lid and cook till peas become soft. Add mashed spinach in it, mix thoroughly and cook till extra water evaporates completely.

Weight of cooked preparation 800g

6 *Methi sag*

Ingredients used	**Quantity**
Fenugreek leaves (*methi*)	1kg
Onion	20g

Garlic	5g
Ginger	5g
Chillies	1g
Turmeric powder	1g
Coriander powder	1g
Oil	15 ml
Salt	according to taste
Water	50 ml

Method: Wash and cut fenugreek leaves. Add water and salt and pressure cook. Mash with a ladle or in a mixer. Heat oil in a skillet. Add chopped onion, garlic and ginger and fry till light brown. Then add spices and mashed fenugreek leaves. Cook for 7-10 min and serve hot with *chapattis*.

Weight of cooked preparation 850g

7 *Chunali sag*

Ingredients used	**Quantity**
Chunali leaves	1kg
Onion	50g
Garlic	5g
Ginger	5g
Chillies	1g
Turmeric	1g
Coriander powder	1g
Garam masala	1g
Oil	15 ml
Salt	according to taste

Method: Clean, wash and cut *chunali* leaves finely. Add one glass water and pressure cook till cooked. Mash cooked leaves. Heat oil in a skillet. Add chopped onion and garlic, fry till light brown. Add spices, mix thoroughly and add mashed *chunali* leaves in it. Cook for 5-10 minutes.

Weight of cooked preparation 700g

Results and Discussion

Mean Acceptability score of different preparations based on green leafy vegetable is presented in table 1, As per the 10 points Hedonic Scale all the prepared products were well accepted. Mean acceptance level for appearance was observed as 7.13 whereas for the taste the mean acceptability score was observed as 6.63. *Sarson sag* was very much liked by all the judges. The mean score for flavour and texture for all the preparations was observed as 7.0 and 7.13 respectively. The mean overall acceptability score for all the products was within the acceptable level.

The analysis of green leafy vegetable based recipes (Table1) showed that the moisture content ranged between 47.8(*rye katlu* and *rye patroda)* and 83.3 (*chunali sag)*. Protein content ranged from 3.26g per 100g in *chunali sag* to 10.77g per 100g in *rye patroda.* Fat content was the lowest (3.84g per 100g) in *sarson sag* and the highest (8.56g per 100g) in *rye patroda,* whereas, ash content was found to be minimum (3.30g per 100g) in *chunali sag* and maximum (5.60g per 100g) in *sarson sag.* Crude fibre content ranged between 2.19 and 4.06g per 100g with minimum in *sarson sag* and maximum in *palak matar.* Carbohydrate content was minimum (2.82g per 100g) in *chunali sag* and maximum in *rye katlu* (26.75g per 100g). Energy value was found to be minimum (82 Kcal) in sarson sag and maximum (216 Kcal) in *rye katlu.*

The analysis for mineral and vitamin content (Table 2) in various products revealed that calcium content was minimum (2300 mg per 100g) in *rye katlu* and *methi sag* and maximum (3200 mg per 100g) in *rye sag.* The iron content ranged from15.46 mg to 20.46 mg in *rye sag* in *methi sag,* respectively. Minimum β -carotene content 735 ug/100g was observed in rye patroda and maximum of 3478ug/100g in *chunali sag.* Ascorbic acid was found to be minimum (3.30 mg per 100g) in *chunali sag* and maximum (17.50 mg per 100g) in *methi sag.*

Table 1. Mean Acceptability score of different preparations based on green leafy vegetable

S.No.	Name of recipes	Appearance	Taste	Flavour	Texture	Overall acceptability
1	Rye katlu	7	7	6	7	6.8
2	Rye patroda	7	7	7	7	7.0
3	Rye sag	7	6	6	7	6.5
4	Palak matar	8	7	8	8	7.8
5	Methi sag	7	6	8	7	7.0
6	Sarson sag	8	8	8	8	8.0
7	Chunali sag	7	6	6	7	6.5
8	Dhura sag	6	6	7	6	6.3
	Mean ±	7.13	6.63	7.00	7.13	6.97
	SD	0.64	0.74	0.93	0.64	0.62

Table 2. Nutrient composition of different preparations based on green leafy vegetable

S.No.	Name of recipes	Moisture (g)	Protein (g)	Fat (g)	Ash (g)	Crude-fibre (g)	CHO (g)	Energy (Kcal)
1	Rye katlu	47.8	9.99	7.66	4.86	2.94	26.75	216
2	Rye patroda	47.8	10.77	8.56	5.52	2.51	24.84	177
3	Rye sag	76.2	4.92	4.30	5.45	2.35	6.65	86
4	Palak matar	70.0	7.05	6.86	5.27	4.06	6.78	117
5	Methi sag	71.3	5.77	6.67	4.70	3.15	8.37	117
6	Sarson sag	76.6	3.95	3.84	5.60	2.19	7.82	82
7	Chunali sag	83.3	3.26	5.07	3.30	2.29	2.82	70
8	Dhura sag	67.42	4.64	12.81	4.20	4.79	6.14	158
	Mean ±	67.55	6.29	6.97	4.86	3.04	11.27	127.88
	SD	13.12	2.77	2.87	0.79	0.94	9.13	51.45

Table 3. Mineral and vitamin content of different preparations based on green leafy vegetable

S.No.	Name of recipes	Calcium mg/100g	Iron mg/100g	β-carotene ug/100g	Ascorbic acid mg/100g
1	Rye katlu	2300	19.46	816	15.66
2	Rye patroda	2500	16.46	735	15.66
3	Rye sag	3200	15.46	3478	10.47
4	Palak matar	2500	12.46	1001	5.16
5	Methi sag	2300	20.46	2067	17.50
6	Sarson sag	2900	17.46	2599	4.87
7	Chunali sag	2800	17.46	3144	3.30
8	Dhura sag	2200	8.46	2509	6.25
	Mean ±	2587.5	15.96	2043.63	9.86
	SD	348.21	3.89	1075.74	5.72

Conclusion

From the above observations it could be concluded that all the green leafy vegetables based traditional recipes being good source of nutrients especially micro nutrients such as calcium, iron as well as β-carotene. All the prepared products were well accepted by the panel of judges. Their inclusion in the daily diet depending upon the availability may prove to be beneficial for the vulnerable section of population.

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