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RESEARCH ARTICLE

ORGANOLEPTIC EVALUATION OF DRIED COLOCASIA LEAVES INCORPORATED IN PALAK PAKORE AND KACHORI

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ABSTRACT

"Arbi leaves", (also known as Taro) in its dry form has been known as a good source of Calcium. Scientifically known as Colocasia *esculenta* and belongs to Araceae. The present study was conducted on "organoleptic evaluation of dried Colocasia leaves incorporated in Palak Pakore and Kachori". In the present study dried Colocasia leaves was incorporated in different ratios in Kachori (5%, 6% and 10%) and Palak Pakore (5%, 6% and 10%). A panel of 12 members was selected through Triangle Test for evaluation of the incorporated recipes. 9 Point Hedonic Rating Scale and Composite Scoring test was used for evaluation. Mean score, S.D, and p-value of t were used for statistical analysis of the scores of acceptability trials of all recipes. On the basis of scores two most acceptable recipes of kachori and palak pakore (5% dried colocasia leaves incorporated) from all the samples were selected and their nutritive value was calculated. The nutrient calculation showed a good increase in calcium with the incorporation of dried colocasia leaves as compared to standard recipe. On the basis of scores 5% dried colocasia leaves incorporated Kachori was most acceptable. It was concluded that dried colocasia leaves could be successfully incorporated in recipes as it is a very good source of calcium and could be very beneficial for women having calcium deficiency.

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INTRODUCTION

Colocasia (colocasia *esculenta*) a member of Aracea is the major and popular vegetable among the arum family due to its peculiar flavour and taste. It is widely grown and used as vegetable in India to offer a supplementary potential source of calories, vitamins and minerals (CSIR, 1950); the versatility of this plant is reflected by the fact that not only the tubers but also the leaves and petioles are used as vegetable in Himachal Pradesh (Singh and Sharma, 2003). Several studies have shown that colocasia contains digestible starch (due to the small size of starch granules), high amount of good quality crude protein, vitamin C, thiamine, riboflavin, niacin, and high scores of amino acids; it has nutritional advantages over root crops and other tuber crops (Talukder et al., 2013). Leaves of Taro (Arbi leaves) are eaten as vegetable by humans, having β carotene iron, protein, vitamins and folic acid which protects against anaemia. The major nutrient in Taro corms is dietary energy, magnesium and calcium.

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Nutritive value of dried colocasia leaves per 100 gm - Energy 277 kcal, Fat 5.9 gm, Carbohydrate 42.3 gm, Protein 13.7 gm, Calcium 1546 mg, Phosphorus 308 mg. (ICMR, 2012) The leaves are often boiled with coconut milk to make a soup which is rich in iron.

Objectives of study

As dry colocasia leaves may be beneficial if incorporated in the human diet as it is a good source of calcium. The present research work had following objectives:-

- To incorporate dried colocasia leaves in different ratios in Palak Pakore and Kachori.
- To evaluate acceptability of the prepared recipes with different proportion of dried colocasia leaves.
- To calculate nutritional value of most acceptable recipe prepared by incorporating dried colocasia leaves.

METHODOLOGY

The methodological aspects of the study are discussed under the following heads-

- Procurement of material
- Product development
- Sensory evaluation

Procurement of Materials

- **Selection of leaves:** Fresh Green colocasia leaves were procured from Agra sabji mandi.

- **Dehydration of leaves & preparation of powder:** Leaves were cleaned & washed with water. Sun drying of leaves was done for 7-8 days until leaves were properly dehydrated for further use. After dehydration the leaves were crushed into very small size with hands.

Product Development

- **Recipe selection by initial trials**: Recipes selection is an important task. Initially steamed, deep fried, shallow fried, baked recipes were selected and incorporation was done of the dry leaves but it was observed that baked & shallow fried recipes were not so acceptable as compared to deep fried recipes. Therefore kachori and Palak pakore were selected as final recipes for sensory evaluation. These trial recipes were evaluated informally.

- **Standardization of recipes (Palak pakore and kachori):** Palak pakore and Kachori, were selected for standardization, the proportion of ingredients for standardized recipes were taken from Kumud Khanna 2004, Usha Raina 2010.

Table 1. Basic and dehydrated colocasia leaves incorporated recipe of Kachori and Palak Pakore

Recipe	Sample Ingredient	A_1 (standard)	B_1 (5%)	C_1 (7%)	D_1 (10%)
Kachori					
	Wheat flour	80 gm.	80 gm.	80 gm.	80 gm.
For dough	Melted fat	1 t	1 t	1 t	1 t
	salt	1/2 t	1/2 t	1/2 t	1/2 t
	Potatoes	30 gm.	24.5 gm.	22.3 gm.	19 gm.
For filling	Red chili powder	a pinch	a pinch	a pinch	a pinch
	garam masala	a pinch	a pinch	a pinch	a pinch
	Fat	for frying	for frying	for frying	for frying
	Dehydrated colocasia leaves	-	5.5 gm.	7.7 gm.	11 gm.
Palak Pakore		A_2	B_2	C_2	D_2
For batter	Besan	50 gm.	50 gm.	50 gm.	50 gm.
	Water	4 T approx.	4 T approx.	4 T approx.	4 T approx.
	Salt	1/4 t	1/4 t	1/4 t	1/4 t
	Red Chilli	1/8 t	1/8 t	1/8 t	1/8 t
	Garam Masala	1/8 t	1/8 t	1/8 t	1/8 t
	Ajwain	a few grain	a few grain	a few grain	a few grain
	Oil	½ t	½ t	½ t	½ t
For the pakoras					
	Palak	40 gm.	35.5 gm.	33.7 gm.	31 gm.
	Salt	1/4 t	1/4 t	1/4 t	1/4 t
	Red Chilli Powder	A pinch	A pinch	A pinch	A pinch
	Fat	for frying	for frying	for frying	for frying
	Dehydrated colocasia leaves	-	4.5 gm.	6.3 gm.	9 gm.

Table 2. Percentage of ingredients in dry colocasia leaves incorporated kachori and Palak pakore

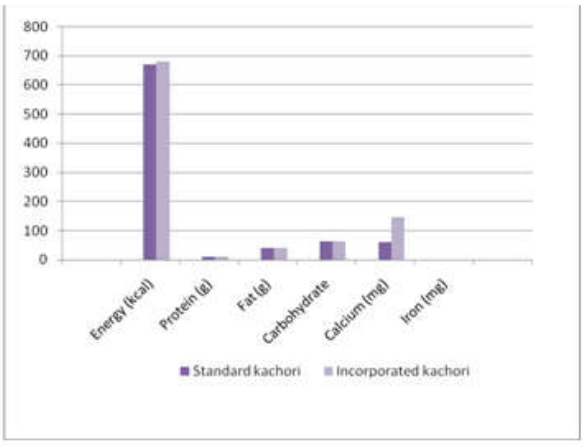
S. No	Recipe	Sample	Percentage of ingredient	
			Basic ingredients percentage	Dry colocasia leaves percentage
1	Standard kachori	A_1	100	-
2	Colocasia leaves incorporated kachori	B_1	95	5
3	Colocasia leaves incorporated kachori	C_1	93	7
4	Colocasia leaves incorporated kachori	D_1	90	10
5	Standard palak pakore	A_2	100	-
6	Colocasia leaves incorporated palakpakore	B_2	95	5
7	Colocasia leaves incorporated palakpakore	C_2	93	7
8	Colocasia leaves incorporated palakpakore	D_2	90	10

Table 3. Table showing mean scores and standard deviation of organoleptic attributes of dehydrated Colocasia leaves incorporated recipes

Dehydrated colocasia leaves/powder incorporate recipes	Sample	% of incor-poration	Colour	appearance	texture	Mouth feel	After taste	Overall acceptability
			M±SD	M±SD	M±SD	M±SD	M±SD	M±SD
Standard kachori	A_1	-	7.83±1.75	7.58±1.73	7.33±1.56	7.50±2.02	7.58±1.73	7.75±1.82
Incorporated kachori	B_1	5	7.66±1.15	7.75±0.97	8.16±1.03	7.75±1.14	7.66±1.07	7.92±0.90
Incorporated kachori	C_1	7	7.41±0.79	7.41±1.00	7.58±0.90	6.91±1.16	6.66±1.23	7.25±0.87
Incorporated kachori	D_1	10	6.58±0.90	6.66±0.98	6.50±1.38	5.83±1.27	6.16±1.59	5.75±1.36
Standard palak pakore	A_2	-	8.25±0.75	7.92±0.67	7.67±1.07	8.00±0.85	8.17±0.83	8.25±0.75
Incorporated palak pakore	B_2	5	7.33±0.65	7.17±0.83	7.17±1.11	7.58±1.38	6.92±1.16	7.33±0.89
Incorporated palak pakore	C_2	7	6.92±1.62	6.83±1.75	6.33±1.92	6.50±1.45	6.42±1.68	6.91±1.58
Incorporated palak pakore	D_2	10	5.42±2.19	5.42±2.11	5.17±1.80	5.83±1.47	5.17±1.99	5.42±1.78

Table 4. Result of nutrient value of most acceptable sample among all the incorporated recipes/serving compared with their standard recipe

	Serving size	Sample	Percentage	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (gm)	Calcium (mg)	Iron (mg)
Standard kachori	5 kachori	A_1	standard	671.1	10.75	41.79	63.69	62.3	0.65
Incorporated kachori		B_1	5%	680.99	11.41	41.57	64.76	146.78	0.65
Standard palak pakore	1 plate	A_2	standard	464.9	12.05	32.88	30.21	58.2	5.20
Incorporated palak pakore		B_2	5%	476.19	12.57	33.113	31.97	124.48	5.15



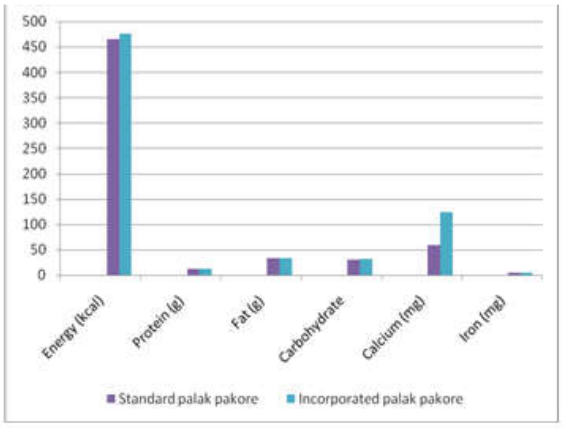


Figure 1. **Figure 1.**

Nutritive value of standard and most acceptable incorporated recipe

- **Preparation of dehydrated Colocasia leaves incorporated recipes:** Four variations at different percentage (standard, 5%, 7% and 10%) of each recipe incorporated with dehydrated colocasia leaves were prepared. The basic recipe was also prepared as standard for sensory evaluation.

Sensory Evaluation of Recipes: Sensory evaluation of recipes prepared by the incorporation of dehydrated colocasia leaves was done with respect to colour, appearance, texture, mouth feel, after taste and overall acceptability.

- **Selection of panel members:** The panel members were selected using triangle difference test.
- 12 students and teachers, who were able to discriminate the odd sample correctly identifying the taste, were selected to constitute the trained panel for the sensory evaluation.
- **Sensory Evaluation of colocasia leaves incorporated recipes:** Nine Point Hedonic scale was used for the sensory evaluation of products and it incorporated all attributes ranging from 'like extremely' to 'dislike extremely' so that very minute differences in the acceptability of product can be detected.
- **Selecting the two best acceptable recipes out of both sample:** The most acceptable recipe among and Palak Pakore were selected form all colocasia leaves incorporated recipes on the basis of mean scores given by panel members.
- Nutritive value of the two best selected samples was calculated

RESULTS AND DISCUSSION

The two best acceptable ratio selected by the panel members was 5% incorporated dried colocasia leaves in Kachori and Palak Pakore. The above table 2 shows the percentage of dry colocasia leaves incorporated in Kachori and Palak Pakore in three variations 5%, 7% and 10% in samples B_1, B_2, C_1 C_2, and D_1, D_2 respectively along with standard basic recipes A_1, A_2.

The above Table 3 shows the mean and standard deviation of sensory evaluation of all attributes in all recipe samples. Nine Point Hedonic Rating Scale was used for sensory evaluation. The most acceptable recipe sample in overall acceptability among all incorporated recipes was Kachori incorporated with 5% of dry colocasia leaves. All the samples of kachori and palak pakore were statistically significant with regard to colour, appearance, texture, mouth feel, after taste and overall acceptability except C_1, C_2 in colour and mouth feel and B_1, B_2 in after taste.Out of all the most acceptable B samples of the 2 recipes energy and fat was more in kachori. Protein and Iron was higher in palak pakore than in kachori. The calcium content was higher in kachori than in palak pakore. The nutritive value of recipes was calculated using Nutritive Value of Indian Food by C. Gopalan (NIN)

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