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## Development and nutrition composition of functional products prepared using fresh Kulfa (*Portulaca oleracea*) leaves

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### ABSTRACT

Micronutrient malnutrition poses a serious threat to the health of vulnerable groups of population. Kulfa, as an important medicinal plant, high in nutritional value and rich in micronutrient was selected for the study. Products namely, *Poha*, *Raita* and *Paratha* were prepared. Organoleptic properties of products were judged by nine point hedonic scale. Proximate composition, mineral and vitamin content of products were analyzed.

**Key words :** Nutrition, Compostion, Kulfa

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### INTRODUCTION

Medicinal plants have been the mainstay of human diets for centuries, providing millions of consumers with important micronutrients, such as vitamins and minerals needed to maintain health and promote immunity against infections. Compared to conventional cultivated species, medicinal plants are hardy, require less care and are a rich source of micronutrients, they could make an important contribution to combating micronutrient malnutrition as well as providing food security (Flyman and Afolayan, 2006).

In nature, there are many plants of promising nutritive value, which can nourish the ever-increasing human population. Many of them are resilient, adaptive and tolerant to adverse climatic conditions. Although, they can be raised comparatively at lower management costs even on poor marginal lands, they have remained underutilized due to lack of awareness and popularization of technologies for utilization. Now-a-days, plant foods are gaining importance as a means to increase the per capita availability of foods (Sheela *et al.*, 2004).

Kulfa (*Portulaca oleracea*) has been used for thousands of years throughout the world for everything from salads to medicines. Kulfa can be found growing wild or cultivated in gardens, in almost any sunny spot. It

is a rich source of important nutrients such as minerals and antioxidants and its edible tissues contain high levels of omega-3 fatty acids, which are recommended for a healthy diet. Kulfa is rich in easily absorbed vitamin C and E, which is known to increase immunity to disease. Dried kulfa has about five times more vitamin E than spinach. It is also a good source of coenzyme Q10. Kulfa is rich in pectin, which is known to lower cholesterol. It has been used as a hypolipidemic agent (lowers the fat content of blood) and in the healing of wounds, boils and burn injuries.

It plays an important role in the life of indigenous people around the world. Therefore, the present study was undertaken to explore possibilities of using the leaves of kulfa (*Portulaca oleracea*) to enrich the various traditional food items to cure deficiency diseases (Sankhala *et al.*, 2005).

### MATERIALS AND METHODS

Fresh sample of kulfa leaves were procured from the local market of Allahabad city. Blanching was avoided due to undesirable colour and increased losses of soluble solids (Baloch *et al.*, 1997). Healthy leaves were sorted after washing and running water for chemical analysis.

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### Chemical analysis:

Nutrients such as moisture, protein, fat, crude fibre, total ash, calcium, iron were analyzed as per AOAC (1997) methods. Vitamin C in the samples was assessed by procedure of (Gupta, 2007). Beta-carotene content of the sample was estimated using the method prescribed by Rangana (2001) with modification in column packing as prescribed by Goodwin (1955).

### Preparation of value added products and analysis:

Products namely, *Paratha*, *Poha* and *Raita* were developed by incorporating kulfa leaves. Incorporation level of kulfa leaves in all the products was 15, 30 and 45 per cent. The proximate principles (energy, fat, protein) and minerals and vitamins like iron, calcium and carotene of the control and enriched products were assessed using the food composition tables (Gopalan *et al.*, 2004) and analyzed value of medicinal plants was determined by calculation method.

## RESULTS AND DISCUSSION

The results obtained from the present investigation have been discussed in the following sub heads :

### Proximate composition of fresh Kulfa (*Portulaca oleracea*) leaves:

Table 1 depicts that kulfa (*Portulaca oleracea*) has moisture, energy, fat, protein and fibre *i.e.* 71.0 g, 18.83 Kcal., 0.60 g, 1.43 g and 1.60 g/100g, respectively. While Table 2 shows the mineral and vitamin content *i.e.* 18.20 mg iron, 211 mg calcium, 19.67 mg vitamin C and 2024 µg β-carotene. Similar trend in the nutrient composition of greens has also been reported by Raghuvanshi *et al.* (2001).

### Products developed with kulfa (*Portulaca oleracea*):

Table 3 shows the organoleptic scores of products namely '*Poha*', '*Raita*' and '*Paratha*' developed by utilizing *Portulaca oleracea* leaves.

### Poha:

The scores for colour, texture, flavour and taste of this product were in the range of 6.78 to 8.47 indicating 'liked slightly' to 'liked very much' as given in Table 2. The maximum scores for overall acceptability was observed for the treatment T<sub>1</sub> which had 15 per cent incorporation followed by T<sub>2</sub> having 30 per cent and T<sub>3</sub> having 45 per cent incorporation of kulfa (*Portulaca oleracea*) leaves.

### Raita:

The treatment T<sub>2</sub> (30 per cent incorporation) of this product was found to be highly acceptable with scores 7.75, 8.17, 8.55, 8.42 and 8.46 for colour, flavour, texture, taste and overall acceptability, respectively. The other levels of incorporation were also liked at various degrees although a little less than T<sub>2</sub>.

### Paratha:

The scores for all the organoleptic parameters for control recipe and product developed by incorporating kulfa (*Portulaca oleracea*) leaves were in the range of 7.74 to 8.67 (liked moderately to liked very much). Among all the treatments T<sub>2</sub> (30 per cent incorporation) showed the best result with respect to overall acceptability.

### Proximate and mineral composition of formulated products:

Table 4 and 5 present information regarding the mean nutrient composition of kulfa (*Portulaca oleracea*) incorporated products (Per 100g). Results showed that the protein content was highest in *Paratha* (11.32 g/100g) and least in *Raita* (3.31 g/100g). This may be due to 55 per cent of wheat flour present in kulfa based *Paratha*, which has higher protein content.

Fibre content of the developed products varied from 0.23 to 2.33 g/100g. In case of *Paratha* it was observed to be maximum not only due to the basic ingredients like wheat flour and onion but also due to incorporation of kulfa leaves. The control recipes in general had low fibre

**Table 1 : Proximate composition of fresh Kulfa (*Portulaca oleracea*) leaves per 100g**

Particulars	Moisture (g)	Energy (Kcal)	Fat (g)	Protein (g)	Fibre
<i>Portulaca oleracea</i> (Fresh leaves)	71.0±0.06	18.83±0.838	0.60±0.124	1.43±0.39	1.60±0.249

**Table 2 : Mineral and vitamin composition of fresh Kulfa (*Portulaca oleracea*) leaves per 100g**

Particulars	Iron (mg)	Calcium (mg)	Vitamin c (mg)	? -carotene (? g)
<i>Portulaca oleracea</i> (Fresh leaves)	18.20± 0.094	211±9.58	19.67±0.52	2024±15.77

**Table 3 : Average mean scores of kulfa (*Portulaca oleracea*) incorporated per 100 g**

Treatments	Colour	Texture	Flavour	Taste	Overall acceptability
<b>Poha incorporated with kulfa leaves</b>					
T <sub>0</sub>	8.62±0.059	8.45±0.08	8.30±0.12	8.20±0.09	8.44±0.05
T <sub>1</sub>	7.95±0.15	8.47±0.12	8.06±0.05	8.25±0.11	8.25±0.10
T <sub>2</sub>	7.3±0.12	7.99±0.16	8.23±0.12	8.12±0.20	8.23±0.12
T <sub>3</sub>	7.01±0.10	7.52±0.13	6.93±0.13	6.78±0.30	7.08±0.35
F cal	17.63 <sup>S</sup>	9.79 <sup>S</sup>	32.55 <sup>S</sup>	15.98 <sup>S</sup>	9.88 <sup>S</sup>
C.D. (P=0.05)	0.21	0.49	0.35	0.59	0.66
<b>Raita incorporated with kulfa leaves</b>					
T <sub>0</sub>	7.93±0.13	8.08±0.06	7.83±0.29	7.75±0.11	7.85±0.01
T <sub>1</sub>	8.00±0.11	8.17±0.07	8.17±0.07	8.00±0.11	7.89±0.06
T <sub>2</sub>	7.75±0.18	8.55±0.08	8.17±0.07	8.42±0.06	8.46±0.12
T <sub>3</sub>	7.5±0.11	8.48±0.13	7.33±0.18	8.17±0.24	7.85±0.04
F cal	2.15 <sup>NS</sup>	8.15 <sup>S</sup>	1.67 <sup>NS</sup>	2.61 <sup>NS</sup>	8.39 <sup>S</sup>
C.D. (P=0.05)	0.49	0.28	1.04	0.60	0.35
<b>Paratha incorporated with kulfa leaves</b>					
T <sub>0</sub>	8.25±0.11	7.9±0.17	8.08±0.24	8.17±0.29	7.94±0.16
T <sub>1</sub>	8.41±0.18	7.74±0.30	7.93±0.18	8.25±0.31	8.00±0.20
T <sub>2</sub>	8.37±0.22	8.08±0.24	8.50±0.11	8.67±0.06	8.44±0.16
T <sub>3</sub>	7.9±0.17	7.83±0.24	8.11±0.06	8.09±0.06	8.23±0.25
F cal	9.05 <sup>S</sup>	2.26 <sup>NS</sup>	3.52 <sup>NS</sup>	1.71 <sup>NS</sup>	9.89 <sup>S</sup>
C.D. (P=0.05)	0.28	0.35	0.45	0.69	0.28

**Table 4 : Proximate composition of kulfa (*Portulaca oleracea*) leaves incorporated products**

Treatments	Moisture (g)	Energy (kcal.)	Protein (g)	Fat (g)	Carbohydrate (g)	Fibre (g)
<b>Poha</b>						
T <sub>0</sub>	8.64±0.31	306.23±1.27	5.72±0.32	6.68±0.16	55.83±0.06	0.62±0.03
T <sub>1</sub>	16.31±0.39	308.23±1.44	5.87±0.07	6.75±0.17	55.92±0.07	0.78±0.02
T <sub>2</sub>	23.85±1.17	310.23±0.99	6.02±0.36	6.81±0.14	58.23±0.38	0.96±0.004
T <sub>3</sub>	31.40±0.81	312.23±0.86	6.18±0.09	6.87±0.17	59.43±0.21	1.12±0.02
<b>Raita</b>						
T <sub>0</sub>	87.35±0.83	58.82±0.07	3.04±0.39	3.92±0.02	2.94±0.02	0.0
T <sub>1</sub>	99.74±0.07	62.82±0.43	3.31±0.07	4.09±0.02	4.69±0.04	0.23±0.009
T <sub>2</sub>	110.38±0.19	65.64±0.04	3.52±0.03	4.18±0.01	6.38±0.06	0.47±0.008
T <sub>3</sub>	121.02±0.13	68.44±0.14	3.74±0.04	4.68±0.04	8.06±0.01	0.70±0.017
<b>Paratha</b>						
T <sub>0</sub>	11.09±0.02	1103.00±0.87	10.75±0.12	90.40±0.26	61.69±0.29	1.69±0.06
T <sub>1</sub>	20.53±0.05	1105.62±0.10	10.94±0.18	90.48±0.08	63.20±0.33	1.90±0.09
T <sub>2</sub>	30.00±0.94	1108.13±0.34	11.13±0.02	90.55±0.08	64.70±0.18	2.11±0.52
T <sub>3</sub>	39.47±0.57	1110.64±0.13	11.32±0.16	90.63±0.05	66.21±0.41	2.33±0.05

content whereas after the incorporation of the kulfa leaves, the values increased considerably. Thus, these food preparations can be recommended to persons requiring high fibre diets.

Fat content of the developed products was in the range of 3.92 to 90.63g/100g. The fat was high in *Paratha*

(90.63 g/100g). This can very well be attributed to the fact that oil/fat is a main ingredient in these preparations. Product like *Raita* (4.68 g/100g) which did not have oil/fat as an ingredient has been found to be lower in this dietary factor.

Carbohydrate content of the developed food products

**Table 5 : Proximate composition of kulfa leaves incorporated products**

Treatments	Iron (mg/100g)	Calcium (mg/100g)	Vitamin C (mg/100g)	Carotene ( $\mu$ g/100g)
<b>Poha</b>				
T <sub>0</sub>	14.27 $\pm$ 0.21	17.92 $\pm$ 0.04	-	1.85 $\pm$ 0.02
T <sub>1</sub>	16.20 $\pm$ 0.37	40.33 $\pm$ 0.22	2.09 $\pm$ 0.17	245.07 $\pm$ 3.61
T <sub>2</sub>	18.13 $\pm$ 0.20	62.75 $\pm$ 0.20	4.17 $\pm$ 0.03	488.59 $\pm$ 5.23
T <sub>3</sub>	20.07 $\pm$ 0.15	85.17 $\pm$ 0.27	6.27 $\pm$ 0.21	732.12 $\pm$ 9.79
<b>Raita</b>				
T <sub>0</sub>	0.19 $\pm$ 0.004	146.08 $\pm$ 0.44	-	30.39 $\pm$ 0.07
T <sub>1</sub>	2.93 $\pm$ 0.01	180.65 $\pm$ 0.42	2.88 $\pm$ 0.05	348.98 $\pm$ 0.76
T <sub>2</sub>	5.64 $\pm$ 0.07	212.28 $\pm$ 0.13	5.76 $\pm$ 0.12	686.03 $\pm$ 0.20
T <sub>3</sub>	8.36 $\pm$ 0.009	243.95 $\pm$ 0.08	8.67 $\pm$ 0.03	1023.09 $\pm$ 0.21
<b>Paratha</b>				
T <sub>0</sub>	4.35 $\pm$ 0.14	42.67 $\pm$ 1.29	-	25.78 $\pm$ 0.10
T <sub>1</sub>	6.78 $\pm$ 0.08	70.80 $\pm$ 0.09	2.62 $\pm$ 0.17	334.04 $\pm$ 2.69
T <sub>2</sub>	9.21 $\pm$ 0.07	98.93 $\pm$ 0.07	5.24 $\pm$ 0.35	639.84 $\pm$ 9.16
T <sub>3</sub>	11.63 $\pm$ 0.15	127.07 $\pm$ 0.8	7.87 $\pm$ 0.38	945.44 $\pm$ 27.32

was found to be in the range of 2.94 to 66.21/100g. *Paratha* showed the highest carbohydrate *i.e.* 66.21 g/100g.

Energy values ranged between 58.82 to 110.64 Kcal/100g. The maximum energy value was observed in *Paratha* which had energy rich ingredients like fat and wheat flour.

The range of iron content in all the developed food products was 0.19 to 20.07 mg/100g. *Poha* was found to be highest in iron content *i.e.* 20.07 mg/100g. The presence of rice flakes and kulfa leaves might be one of the contributing factors for higher iron content among the products.

The increase in values can be said to be proportionate to the quantities of medicinal plant added to the main ingredient. On the whole it can be concluded that medicinal plant incorporated food products can supply a good amount of iron and these product can be used for improving iron status of population group among whom the deficiency is currently one of the important nutritional problem.

The calcium content of the developed products ranged from 17.92 to 243.95 mg/100g. Kulfa leaves based product *Raita* had higher calcium content (243.95 mg/100g) among the products.

It is well recognized fact that green plants are rich in  $\beta$ - carotene. The *Raita* which had kulfa (*Portulaca oleracea*) incorporation gave identical carotene values *i.e.* 1023.09  $\mu$ g/100g which was maximum among all the products.

### Conclusion:

It can be concluded from the results that the

incorporation of kulfa (*Portulaca oleracea*) leaves in various traditional food items can improve the nutritional quality of products as well as add variety in the diet.

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