



Development of Nutritious Recipes Incorporation of Waste Leaves of Rajgira Plant

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ABSTRACT

Vegetables are very important for human health because of their vitamins, minerals, phytochemical and dietary fibre content. Adequate consumption of green leafy vegetables can protect from some chronic diseases such as diabetes, cancer, obesity, cardiovascular diseases and metabolic syndrome. Rajgira leaves are rich and inexpensive source of dietary fiber, protein, vitamins and wide range of minerals. Yet the consumption is not as it should be because the leaves are underutilized or at various places it avoided as waste material. Looking to the importance of Rajgira leaves the endeavour involves preparing traditional, cheap and nutritious recipes with the incorporation of Rajgira leaves powder in different concentration that can contribute significant amount of vitamin-A, iron, calcium and vitamin C in the diet. Two recipes selected for incorporation of Rajgira leaves powder were poori and kharapara. The products were prepared without incorporation of Rajgira leaves powder (Control) and with 5, 10, 15 and 20 per cent incorporation. Highly accepted recipes were selected for the evaluation of nutritional composition. The result indicated that incorporation of Rajgira leaves powder significantly increased the content of fiber and total mineral.

Keywords: Rajgira leaves, Recipes, Nutritional Evaluation.

I. INTRODUCTION

Vegetables are very important for human health because of their vitamins, minerals, phytochemical and dietary fiber content (Ülger et al. 2018). Vegetables also carry plenty of phytochemicals such as beta carotene and flavonoids. Indian Council of Medical Research (ICMR) recommends 100 g of green leafy vegetable daily for an adult man. Green leafy vegetables are a rich source of nutrients such as calcium, iron and riboflavin. They are high in dietary fiber, low in lipids and rich in folate, vitamin C, vitamin K, magnesium and potassium. Green leaves are rich in antioxidant vitamins such as vitamin A, vitamin C and vitamin E and also dietary fiber content which have important roles in human health (Ülger et al. 2018).

Adequate consumption of green leafy vegetables can protect from some chronic diseases such as diabetes, cancer, obesity, cardiovascular diseases and metabolic syndrome as well as improve risk factors related with these diseases (Ülger et al. 2018). The low calorie value of the green leafy vegetables makes them an ideal food group for weight management. Green leafy vegetables are recognized as a potential protein source for food applications based on their nutritional profile and their large availability in agricultural waste streams. For most

industrialized crops, only specific parts of the plants such as roots, flowers and fruits are harvested and processed, while the green leaves are left unused (Tenorio, 2017). In nature, there are many parts of green plant which are underutilized and they have promising nutritive value, which can help to nourish the ever increasing human population. Many of them are adaptive, resilient and tolerant to adverse climatic conditions (Joshi, et al. 2010). Rajgira leaves are rich and inexpensive source of dietary fiber, protein, vitamins and wide range of minerals (Prakash and Pal. 1991) Rajkeera leaves (*Amaranthuspaniculatus*) are very good source of-carotene (14,190 ug/100g) and iron (18.4 mg/100g), fiber (2.1 g/100g), calcium (530 mg/100g) and vitamin C (81 mg/100g). This leaves are low in saturated fat and very low in cholesterol. It is also good source of Niacin, Riboflavin, vitamin B6, folate and all other minerals (Gopalan et al, 2000). It contains higher proportion of insoluble lignin and has low glycaemic. Yet the consumption is not as it should be because the leaves are underutilized or at various places it avoided as waste material.

Rajgira leaves (*Amaranthuspaniculatus*) belongs to the family Amaranth. In Marathi it is known as Tambadibhaji. Its common /local name is Chinese spinach. The colour of leaves vary from green to deep purple. It is seasonal plant an is available in plenty in winter season May-Oct. plant tends to be more fibrous and less succulent and is very sensitive to water logging. The leaves are harvested by pulling out the seedlings or cutting the plant 6-8 inches from the top. This can be done 20-30 days after sowing, if the plant is left for too long, it become fibrous. It was cultivated in Mexico over 7000 years ago and was used by Aztecs as a source of food. It is grown in east and west coast of India and Himalayan region for several years. Shende (2006) found, Rajgira leaves can be considered as a good and cheapest source of iron and calcium, therefore, it can be recommended for consumption in the diet of the community to reduce the prevalence of anaemia.

Looking to the importance of rajgira leaves the endeavour involves preparing traditional, cheap and nutritious recipeswith the incorporation of Rajgira leaves powder in different concentration that can contribute significant amount of vitamin-A, iron, calcium and vitamin C in the diet.

The rajgira leaves were procured cleaned, washed and dried in mechanical drier. The fine powder of dried leaves was prepared using mixer. Two recipes selected for incorporation of rajgira leaves powder were *poori* and *kharapara*,The products were prepared without incorporation of Rajgira leaves powder (Control) and with 5, 10, 15 and 20 per cent incorporation. Highly accepted recipes were selected for the evaluation of nutritional composition. The nutrient analysis consisted of estimation of moisture, ash, fat, fiber (AOAC, 1975) and protein was estimated by macrokjeldhal method. The carbohydrate content was calculated by difference method. The calcium and magnesium were estimated by EDTA method.

The trace elements (iron, copper, manganese and zinc) were estimated by atomic absorption spectrophotometer (Model 3110). The data obtained was analyzed by application of suitable statistical method to find out the significant differences between different aspects. The difference with regard to nutrient content of selected recipes prepared with and without incorporation of rajgira leaves powder were tested by "T" test (Panse and Sukhatme, 1988).

II. RESULTS AND DISCUSSION

The proximate composition of selected recipes with and without incorporation of rajgira leaves powder is given in Table 1. Moisture, protein and fat content of *poori* prepared with and without incorporation of rajgira leaves

powder were found to be 9.1 percent and 6.8 percent 22.1 percent and 20.88 percent 15.6 percent and 10.75 percent respectively.

Fiber content of *poori* prepared with and without incorporation of rajgira leaves powder was found to be 6.6 per cent and 3.52 per cent, respectively. The result indicated that the values obtained for fiber of *poori* prepared with incorporation of rajgira leaves powder was increased significantly. The increase in the fiber content of *poori* prepared with of rajgira leaves powder is good attributes for therapeutic purpose, in recent years it is suggested that some amounts of dietary fiber must be present in the diet. Dietary fiber helps to relieve constipation and lower blood cholesterol level. Total minerals content of *poori* prepared with and without incorporation of rajgira leaves powder found to be 3.96 per cent and 2.24 per cent. The carbohydrate content of *poori* with and without incorporation of rajgira leaves powder was found to be 43.5 per cent and 55.58 per cent respectively. Result indicated that the carbohydrate content of the *poori* with incorporation of rajgira leaves powder was decreased significantly. As the carbohydrate was calculated by subtraction method, the elevation in other nutrients results in decreasing the carbohydrate content.

The content of moisture was high 7.88 per cent in *Kharapara* prepared with incorporation of rajgira leaves powder, while it was low 6.46 in *kharapara* prepared without incorporation of rajgira leaves powder, protein content of *kharapara* prepared with and without incorporation of rajgira leaves powder registered 13.12 per cent 11.58 per cent. The content of fat in *kharapara* was 27.3 per cent recorded more in with incorporation of rajgira leaves powder than that of without incorporation of rajgira leaves powder. Even fiber and total minerals (9.2% and 4.7%) were found to be more in *kharapara* prepared with incorporation of rajgira leaves powder. The result indicated that incorporation of rajgira leaves powder significantly increased the content of fiber and total minerals. The medicinal value of herbs is due to the presence of components in it. Dietary fibre exert beneficial effect mostly by way of their swelling properties and by increasing transit time in the small intestine. Consequently, they reduce the rate of release of glucose and its absorption and helps in the management of diabetes.

Table1. Proximate composition of recipes with and without incorporation of Rajgira leaves

Recipe	Moisture (g/100g)	Protein (g/100g)	Fat (g/100g)	Fiber (g/100g)	Total minerals(g/100g)	CHD (g/100g)
Poori						
With RLP	9.1± 1.00 ^o	22.1±1.000	15.16±1.000	6.6±0.300	3.96± 1.00	43.5± 0.529
Without RLP	6.81±1.000	20.28±2.000	10.75±0.100	3.52± 0.020	2.24±0.040	55.58 ±1.000
“t” value	2.30^{NS}	0.80^{NS}	6.98^{NS}	19.14^{**}	3.12^{NS}	20.25^{**}
Kharapara						
With RLP	6.00±0.500	13.12±1.000	27.30±0.265	9.2 ±0.200	4.7± 0.200	38.1± 1.000
Without RLP	6.46± 1.000	11.58± 0.000	25.76± 3.000	3.27±1.000	3.57± 0.020	48.98±1.000
“t” value	1.35^{NS}	2.68^{NS}	0.8^{NS}	12.90^{**}	10.92^{**}	10.93^{**}

NS – Non significant * - Significant at 5 per cent ** - Significant at 1 per cent

The mineral composition of selected recipes with and without incorporation of Rajgira leaves powder is given in Table 3. Iron and calcium content of *poori* with incorporation of rajgira leaves powder were (7.68 mg/100 g) and (204 mg/100 g) respectively. The respective values for corresponding *poori* without incorporation of rajgira leaves powder were 3.69 mg/100 g, and 51.9 mg/100 g. Singh et al (2002) also reported that the products prepared from green leaves and powders are rich in iron and beta-carotene and can be useful for benefit of rural

population. The poori prepared with incorporation of rajgiraleaves powder registered the values for magnesium, manganese, copper and zinc were 120 mg 100g, 1.05 mg/100g, 1.43 mg/100g and 1.38 mg 100 g. respectively. While the poori prepared without incorporation of rajgira leaves powder registered low values 45.8 mg/100 g, 0.98 mg/100g, 0.34 mg/100 g and 0.65 mg/100 g for above nutrients. The significant difference was noticed in magnesium and zinc content of poori. On the whole the incorporation of rajgira leaves powder increased the calcium, magnesium and iron content of poori which has health benefits as supply of trace elements in the diet is of great current interest to the nutrition of the community because increasing evidence of their marginal or inadequate intake among different segments of the population (Weaver et al. 1987).

The contents of iron (9.52 mg/100 g), calcium (132.6 mg 100g) magnesium (106.68 mg/100g), manganese (1.00 mg/100g), copper (1.575 mg/100 g) and zinc were (1.33 mg/100g) in kharapara prepared with incorporation of rajgira leaves powder. The respective values for kharapara prepared without incorporation of rajgira leaves powder for above nutrients were 4.84mg/100g, 51.35 mg/100 g, 33.88 mg/100 g, 0.77 mg/100 g, 1.33 mg/100 g and 1.00mg/100g. From the result it was inferred that kharapara prepared with incorporation of rajgira leaves powder contained all nutrients in increased amount which were statistically significant except iron and zinc content. Therefore the kharapara with incorporation of rajgira leaves powder can be encouraged for consumption among the community to increase nutrient and to decrease the carbohydrate content of the diet which have better health benefits.

Table1. Minerals composition of recipes with and without incorporation of Rajgira leaves

Recipe	Iron (mg/100g)	Calcium (mg/100g)	Magnesium m(g/100g)	Maganese (mg/100g)	Copper(mg/100g)	Zinc (mg/100g)
Poori						
With RLP	7.68±1.000	204±4.000	120±5.000	1.05±0.0500	1.43± 0.470	1.38± 0.100
Without RLP	3.69±0.100	51.9±1.000	45.8±1.000	0.98± 0.012	0.34±0.100	0.65 ±0.020
“t” value	7.71^{NS}	88.22^{**}	23.19^{**}	1.83^{**}	5.31^{NS}	11.41^{**}
Kharapara						
With RLP	9.52±1.000	132.6±10.000	106.6±1.000	1.00 ±0.000	1.575 ±0.010	1.33± 0.330
Without RLP	4.48± 0.040	51.35±0.570	33.88± 3.000	0.77±0.020	1.33± 0.030	1.00±0.000
“t” value	7.83^{NS}	15.66^{**}	35.13^{**}	20.01^{**}	36.54^{**}	1.74^{NS}

NS – Non significant * - Significant at 5 per cent ** - Significant at 1 per cent

III. CONCLUSION

On the whole result can be concluded that rajgira leaves powder contained significantly higher amounts of nutrients. Recipes prepared with incorporation of rajgira leaves powder had shown better nutritive value with the maximum increase in total minerals, crude fiber, protein, iron and calcium content than the product prepared without incorporation of rajgira leaves powder.

IV. REFERENCES

[1]. A.O.A.C. (1975), Official method of analysis, 12th edition of the official Agril.Chemists, Washington.

- [2]. Balaji T., Acharya RN, Nair AGC Reddy A.V.R, Rao K.S., Naidu G.R.K and Manohar S.B. (2000). Determination of essential elements in ayurvedic medicinal leaves by K0 standardized instrumental neutron activation analysis. *Journal of radio analytical and nuclear chemistry*, 243 (3):783-788
- [3]. Gopalan, G., Rama Sastri, B and Balasubramaniam.S (2000). *Nutritive Value of Indian Foods*, National Institute of Nutrition, Indian Council of Medical research, Hyderabad, India.
- [4]. Gopalan C. (1996) Combating vitamin A deficiency and micronutrient malnutrition through dietary improvement: An overview. In: *use of carotene rich foods to combat vitamin A deficiency in India. A multicentric study.* Shehtri S (ed.) V-XI, New Delhi, India, p.5-11.
- [5]. Joshi, P., &Mathur, B. (2010). Bioavailability of iron from the leaf powders of dehydrated less utilized green leafy vegetables. *Asian j ExpBiolSci*, 1(4), 845-854
- [6]. Joshi, P., &Mathur, B. (2010). Preparation of value added products from the leaf powders of dehydrated less utilized green leafy vegetables. *Journal of horticulture and forestry*, 2(9), 223-228.
- [7]. NarsingaRao B.S., Deosthale YG, and Pant K.C. (1989) *Nutritive value of Indian foods* National institute of nutrition, Indian Council of Medical research, Hyderabad, India.
- [8]. Panse, VG and Sukhatme, P.V. (1985) *Statistical methods for agricultural workers*. ICAR Publications, New Delhi, 58-60, 97-110
- [9]. Prakash, D. and Pal. M. (1991) Nutritional and anti-nutritional composition of vegetables and grain amaranth leaves, *J Sci Food Agric*. 57-573-585
- [10]. Shende, TL. (2006) Bioavailability of iron and calcium content of uncommon leafy vegetables. M.Sc. Thesis, M.A.U. Parbhani.
- [11]. Singh, G. and Kwatra, A. (2006) Development and nutritional evaluation of recipes prepared using fresh and dried amaranthus leaves. *J. Food Sci. Technol.*, 43(5)-509-511
- [12]. Tenorio, A. T. (2017). *Sugar beet leaves for functional ingredients* (Doctoral dissertation, Wageningen University and Research). Veena, B. M., Shivaleela, H. B., & Ravidra, U. (2019). Enhancement of nutritional quality of pasta by incorporating underutilized greens. *Journal of Pharmacognosy and Phytochemistry*, 8(4), 3118-3121.
- [13]. Ülger, T. G., Songur, A. N., Çırak, O., & Çakıroğlu, F. P. (2018). Role of vegetables in human nutrition and disease prevention. *Veg. Importance Qual. Veg. Hum. Health*, 7-32.