Nutrition Rich Green Leafy Food for Healthy Diet

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ABSTRACT

Green leafy vegetables constitute a diverse group of plant-based foods that are rich in essential nutrients and contribute significantly to human health. These vegetables, including spinach, kale, celery, lettuce, fenugreek, Amaranthus and coriander are known for their high nutritional value and potential health benefits. They are particularly rich in vitamins A, C, and K, essential for maintaining optimal vision, immune function, and blood clotting. Additionally, they provide a range of minerals such as iron, calcium, and magnesium, crucial for bone health, blood formation, and overall well-being. Green leafy vegetables are valuable components of a healthy diet, providing a plethora of essential nutrients and bioactive compounds. Their consumption is associated with numerous health benefits, making them a crucial element in promoting overall well-being and preventing chronic diseases. Encouraging the inclusion of these nutritious vegetables in daily dietary practices are a simple yet effective strategy for enhancing human health.

INTRODUCTION

Vegetables play important role in food and nutritional security. Green leafy vegetables are considered as exceptional source for vitamins, minerals and phenolic compounds. Mineral nutrients like iron and calcium are high in leafy vegetables

than staple food grains (Arasaretnam, *et al*., 2018). Many leafy vegetables especially, amaranth, fenugreek, palak and spinach has attained commercial status and its cultivation is wide spread in India. Because of their low production cost and high yield, green leafy vegetables are considered to be one of the cheapest vegetables in the market and it could be rightly described as 'poor man's vegetables' (Gowthami, *et al*., 2016). Also, leafy vegetables are the only natural sources of folic acid, which are considerably high in leaves of *Moringa oleifera* plants as compared to other leafy and non-leafy vegetables.

A part from being a rich source of micronutrients and vitamins the leafy vegetables are also said to be a good source of antioxidants. Leafy vegetables contain number of phytochemicals which help to protect the cells from oxidative damage induced by free radicals and thereby help to reduce the oxidative stress and thereby play a role in health management, especially, lowering risk of chronic human aliments such as cancer, cardiovascular disease and other age-related disorders (Nadeeshani, *et al*., 2017).

Nutritional factors in green leafy vegetables:

Proteins:

Proteins are large and complex molecules composed of various compositions of amino acids. Proteins have primary importance in the daily diets of consumers. Green leafy vegetables are the richest and cheapest sources of proteins. This is because of their ability to synthesize and accumulative amino acids with the help of abundant source of sunlight, water, oxygen and nitrogen which is readily available in the atmosphere.

Dietary fiber:

Green leafy vegetables have been traditionally recognized as good sources of dietary fiber. Indian Green leafy vegetables such as basella (*Basella rubra*), fenugreek (*Trigonella foenum graecum*), hibiscus (*Hibiscus cannabinus*), coriander (*Coriandrum sativum*), cabbage (*Brassica oleracea*) and spinach (*Spinacia oleracea*) are good sources of soluble dietary fiber content. Consumption of higher levels of vegetable fiber resulted in reduced risk of cardiovascular diseases and possibly, colon cancer.

Vitamins:

Green leafy vegetables are abundant sources for β-carotene. Cereals and pulses are devoid of vitamin C whereas, leafy vegetables are the potential sources of vitamin C with good amount in kale. Vitamin B5 in cereals and pulses are higher than spinach and kale. Plants are the major source of foliates for humans especially, green leafy vegetables. Cereal grains and tuber based staple diet are very low in foliate, which can be improved by the addition of green leafy vegetables.

Minerals:

Green leafy vegetables are good sources of mineral nutrients. Spinach has highest amount of calcium, magnesium, iron and sodium. Minerals have greater stability during food processing as compared to vitamins and proteins.

Essential fatty acids:

Omega-3 fatty acids are important for normal growth and development, and play vital role in the prevention and treatment of coronary artery diseases, hypertension, diabetes, arthritis, cancer and other inflammatory and autoimmune disorders.

Palak:

Palak is botanically known as *Beta vulgaris* L. *var. bengalensis Roxb* and member of family chenopodiaceae. Rich source of vitamin A as

compared to carrot and spinach. Also contains high quantity of ascorbic acid and iron. Its succulent leaves and stems from a nutritious dish after cooking. The herbaceous parts are mildly laxative besides other medicinal values.

Spinach:

Spinach is botanically known as *Spinacea oleracea* L. and member of family chenopodiaceae. Spinach contains vitamin A, B9 and K as well as minerals like iron, calcium, magnesium and manganese. Spinach contains lutein which prevents macular degeneration that can lead to blindness in the elderly.

Amaranthus:

Amaranthus is botanically known as *Amaranthus tricolor* L. and member of family amaranthaceae. It is used as vegetable, grain and fodder. In increasing the blood hemoglobin (high amount of Folic acid) (Gupta *et al*., 2017). It is a source of key vitamins and minerals like calcium, magnesium, potassium, phosphorus and iron. Tender leaves and stems are consumed as vegetables.

Coriander:

Coriander is botanically known as *Coriandrum sativum* L. and member of family umbelifarae. The pleasant aroma is due to an essential element called d-linalol or coriandrol. Coriander seeds have medicinal properties too and therefore used as a carminative and diuretic. The paste made from seed is useful in dyspepsia. Coriander seeds are used for the preparation of mouth freshner.

Fenugreek:

Fenugreek is botanically known as *Trigonella foenum graecum* L. and member of family fabaceae. Kasuri methi is a good source of dietary fiber, high in protein content and rich in iron. The mineral and vitamins present in the leaves include calcium, zinc, phosphorus, riboflavin, carotene, thiamine, niacin and vitamin C. it is anti-diabetic and lower blood cholesterol levels. The seeds are eaten either boiled or raw with honey in Greece.

Lettuce:

Lettuce is botanically known as *Lectuca sativa* and member of family asteraceae. It is rich in vitamin A and minerals like calcium, phosphorus, sodium, sulphur, magnesium and potassium. It also contains protein, carbohydrates and vitamin C. it is a popular salad crop mostly in cities. It has crisp in texture.

Celery:

Celery is botanically known as *Apium graveolens* and member of family apiaceae. Celery stalks have only moderate levels of vitamins, but have a low percentage of carbohydrate and negligible fat, it is popular with dieters. Sliced stalks are also used as an ingredient in soup. The main use of celery is as a salad dish. Celery is cultivated for its succulent flavored leaves, seeds and essential oil.

Parsley:

It is botanically known as *Petroselinum crispum* and member of family apiaceae. Green parsley leaves have a mild, agreeable flavor, and are an excellent source of vitamin C, iodine and iron. Dehydrated parsley flakes are produced from parsley grown on commercial fields.

Kale:

It is botanically known as *Brassica oleracea var. acephala* and member of family brassicaceae. It also contains antioxidants such as lutein and beta-carotene, which reduce the risk of disease caused by oxidative stress. Kale

is high in oxalic acid, the levels of which can be reduced by cooking. Kale is good source of thiamin, riboflavin, vitamin E and vitamin A.

Nutritional status:

Crops	Protein (g)	Fat (g)	Iron (mg)	Fibre (g)	Carbohydrates (g)	Calcium (mg)	Phosphorus (mg)	Energy (kcals)
Amaranthus	14	1	7.6	2	19	159	557	371
Celery	6	1	6	1	2	230	140	37
Coriander	3	1	1	1	6	184	71	44
Fenugreek	4	1	2	1	6	395	51	49
Lettuce	2	0	2	0	2	50	28	21
Parsely	6	1	18	2	13	390	175	87
Spinach	2	1	1	1	3	73	21	26
Kale	4.3	0.9	1.5	3.6	8.8	254	55	49
Palak	3.4	0.8	-	-	6.5	380	30	46

Processing methods to reduce anti nutrients:

Heat treatment is the most effective method to reduce the anti- nutrition factors present in green leafy vegetables so far. Cooking and blanching help in the removal of anti-nutrients through rupturing the plant cell wall followed by leaching out of soluble compounds into the blanching medium (Yadav *et al*., 2013). The levels of phytic acid and oxalic acid can be effectively reduced by cooking and blanching methods. Oxalic acid content was reduced by blanching and cooking whereas drying and storage did not significantly affect anti-nutrition factors in green leafy vegetables (Hemmige, *et al*., 2017).

CONCLUSION:

Green leafy vegetables provide vital nutrients required for human health and wellbeing. In rural areas, traditional leafy vegetables play important role as nutritional source, and it is available all-year. Green leafy vegetables are usually considered as the cheapest source of food for vitamins and micronutrients supplementation to combat nutrients deficiencies. The presence of anti-nutritional factors such as nitrates, oxalates, phytates, cyanogenic glycosides and tannins in green leafy vegetables can affect micronutrients absorption and thus, make the latter unavailable. Thermal processing of leafy vegetables through boiling, cooking and blanching before consumption help in reducing the level of anti-nutrients.

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Palak


Spinach


Fenugreek


Kale


Coriander


Amaranthus


Parsely


Moringa


Lettuce


Celery