Importance of Vegetables in the Human Diet

Niraj Kumar Prajapati

ICAR- Indian Institute of Vegetable Research, Varanasi - 221305 (U.P.) India

Corresponding Author*
Niraj Kumar Prajapati

Email
nkp.ofcl@gmail.com

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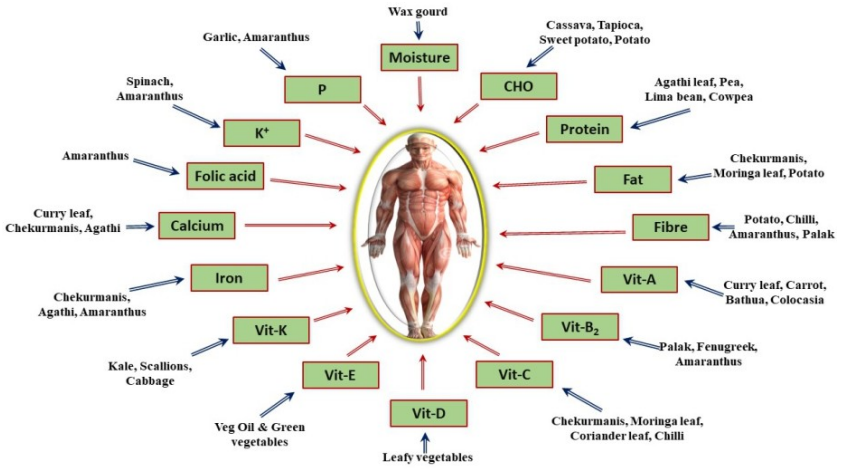

FIGURE 1: Source of Nutrient in Vegetables

KEYWORDS: Healthy diet, Health, Disorders, Human, Nutritive value, Vegetables, etc.

SUMMARY

Vegetables are considered essential for a balanced diet because they provide vitamins, minerals, fibre, and phytochemicals. Appropriate consumption of vegetables can prevent chronic diseases such as diabetes, cancer, obesity, metabolic syndrome, and cardiovascular diseases and improve the risk factors associated with these diseases. Vegetables are used as leaves, stems, fruits, flowers, roots, etc. Vegetables also have seasons and their own nutritional value. They are not only a storehouse of many nutrients but also have therapeutic value, and they exhibit antioxidant properties. Important metals are delivered to our bodies by plants absorbing them from the soil. This article will provide basic information about the importance of vegetables in the human diet as well as their effects on vegetable food content and human health.

INTRODUCTION

Vegetables are an indispensable part of the human diet, not only for vegetarians but also for non-vegetarians. They are plant derivatives and generally are mature ovaries, fruits, flowers, stems, roots, and plant leaves; each part contributes to the diet in its own way.

Vegetables are important for human nutrition in terms of high carbohydrates, proteins, lipids, and bioactive nutrient molecules such as dietary fibres, vitamins, and minerals, as well as non-nutritive phytochemicals (phenolic compounds, flavonoids, bioactive peptides, etc.). These nutritional and non-nutritional molecules lower the risk of obesity, diabetes, certain cancers, and chronic diseases like cardiovascular diseases. They are useful for maintaining the body's alkaline reserves. They consist of important nutritional components that can be used to build up and repair your body.

A plant-based diet, focused primarily on vegetables, fruits, and whole grains, has become one of the most important guidelines for reducing the risk of diseases in humans. Therefore, it is necessary to improve the nutritional value of the final product of vegetable crops.

There is scientific consensus that a balanced, rotating diet that includes a variety of vegetables is one of the best ways to get nutrients from food from an early age. Most health experts recommend eating vegetables every day because they are low in calories but high in nutrients.

The ICMR recommends 300 grammes of vegetables per day per capita (125 gm of green leafy vegetables, 100 gm of root vegetables, and 75 gm of other vegetables) for a balanced diet.

Definition

Vegetables are annual or perennial herbaceous plants or their parts that can be consumed fresh, processed or unprocessed, and are high in minerals and vitamins while being low in harmful alkaloids. Biologically, a vegetable is a designated member of the plant kingdom.

NUTRIENTS IN VEGETABLES

(a) Carbohydrates: Sugars, Starches, Cellulose and Fibres

CHO is a major energy source derived from starchy vegetables. Carbohydrates are composed of carbon, hydrogen, and oxygen and are either structurally simple (monosaccharides and disaccharides) or complex (polysaccharides such as starch and fructose).

Cellulose is a polymer of glucose that humans do not use for energy. Certain animals, such as ruminants, can utilize cellulose due to the presence of a microbiota in their digestive tract.

Fiber is composed of cellulose, hemicellulose, pentosan, pectin, a mixture of polysaccharides, and lignin, which influence the texture of plant foods. They are mostly complex compounds that the body cannot convert into energy. Dietary fibre comes in two basic forms: insoluble and soluble. Although they are not directly absorbed, they

provide bulk, influence digestion and nutrient absorption, and act as "roughage" in intestinal regulation. Vegetables are important sources of both types of fibre. The body receives 4 calories of energy from each gram of carbohydrate.

(b) Lipid and Fats

Lipids are organic compounds that are insoluble in water and provide concentrated energy. They are structural components of cell membranes, act in the absorption of vitamins, the regulation of blood pressure, and smooth-muscle control, and interact with enzymes and hormones. Essential fatty acids, those that cannot be synthesized by the body, are linoleic acid and linolenic acid. Fats are esters of long-chain organic acids and alcohols like glycerol. Most fats occur as triglycerides. Triglycerides consist of three fatty acid chains connected to a glycerol molecule. The total number of double bonds determines the degree of saturation. Saturated fatty acids (SFAs) have no double bonds, monounsaturated fatty acids (MUFAs) have one double bond, and polyunsaturated fatty acids (PUFAs) have two or more double bonds. Vegetable fatty acids are more often monounsaturated or polyunsaturated than those of animal origin. Each gram of fat provides 4 calories of energy to the body.

(c) Protein and Amino Acids

Protein is made up of carbon, hydrogen, oxygen, nitrogen, and Sulphur. These are combined to form amino acids, which are comprised of carboxyl (-COOH) and amino ($-NH_2$) groups. Protein is the second-most abundant substance in the human body after water.

Proteins act as the building blocks of cells and are important components of enzymes. Proteins of animal origin are often higher in "protein quality" than plant-based proteins. Nevertheless, a large portion of the world's population has limited access to animal protein, so contributions from plant sources are very important. The body receives 4 calories of energy per gram of protein.

Table 1: Nutrients and their deficiency disorders

S.N.	Nutrients	Deficiency disorder
1.	Carbohydrates	Malnutrition
2.	Fats	Lack of energy and weakness
3.	Protein	Kwashiorkor (swelling) and marasmus (weight loss)
4.	Fibre	Improper bowel movement and heart diseases

(d) Minerals

Minerals are inorganic substances that occur naturally, have a specific chemical composition, and have an ordered atomic structure. 25 out of the 92 minerals that occur naturally in living bodies are the building blocks of bones, teeth, blood, muscles, hair, and nerve cells. Vitamins cannot be properly absorbed without a balance of minerals. They interact with vitamins and hormones and in other physiological processes, and they also act as components of the enzymatic system. It is classified as macro-minerals (Calcium, Phosphorus, Potassium, Magnesium, Sodium, and Chlorine) and micro-minerals (Iron, Zinc, Molybdenum, Iodine, Copper, Selenium, Manganese, Fluoride, Cobalt, and Chromium).

Table 2: Minerals and their deficiency disorders

S.N.	Minerals	Deficiency disorder
1.	Calcium	Rickets, Osteomalacia (Brittle bones)
2.	Phosphorus	Bad teeth and bones
3.	Potassium	Hypoklemia (loss of heartbeat), Muscles paralysis
4.	Magnesium	Low Appetite, Fatigue, Nausea, Numbness, Tingling, Seizures
5.	Sodium	Hyponatremia
6.	Chlorine	Hypochloraemia
7.	Iron	Anaemia
8.	Zinc	Hair loss, Eye and skin lesions, Taste alterations
9.	Molybdenum	Encephalopathy
10.	Iodine	Goitre (Enlarged thyroid gland)
11.	Copper	Thrombocytopenia, Hypocupremia
12.	Selenium	Keshan disease
13.	Fluoride	Osteoporosis

(e) Vitamins

Vitamins are essential components of enzymes and are involved in cellular energy production and the transfer and biosynthesis of compounds. Almost all are obtained from the diet or are supplemented, as most are not synthesized by the body except for biotin, folic acid, and Vit- K, which are synthesized by intestinal tract bacteria. The body stores fat-soluble vitamins, but water-soluble vitamins are not stored in significant amounts. Based on their solubility Vitamins are classified as fat-soluble or water-soluble, and vitamin deficiency causes many disorders, as shown in Table 3.

Table 3: Vitamins and their deficiency disorders

S.N.	Vitamins	Chemical name	Deficiency disorder
Group - A: **Fat soluble**			
1.	Vit-A	Retinol	Blindness
2.	Vit-D	Calciferol	Rickets, Caries, Osteomalacia
3.	Vit-E	Tocopherols	Hemolytic anemia, Sterility
4.	Vit-K	Phyllo quinone	Bleeding, diathesis
Group - B: **Water soluble**			
5.	Vit-C	Ascorbic acid	Scurvy
6.	Vit-B complex		
i.	Vit-B_1	Thiamine	Beri-Beri
ii.	Vit-B_2	Riboflavin	Ariboflavinosis, Ulcer in oral cavity, Cracked lips
iii.	Vit-B_3	Niacin	Pellagra
iv.	Vit-B_4	Choline	Liver disease
v.	Vit-B_5	Pantothenic acid	Paraesthesia
vi.	Vit-B_6	Pyridoxine	Anemia
vii.	Vit-B_7	Biotin	Dermatitis
viii.	Vit-B_8	Inositol	Depression, Hair loss, Acne, Psoriasis
ix.	Vit-B_9	Folate	Megaloblastic anemia
x.	Vit-B_{10}	PABA	Eczema, Scleroderma, Vitiligo
xi.	Vit-B_{11}	Salicylic acid	Cardiovascular disease, Neuro-degeneration
xii.	Vit-B_{12}	Cobalamin	Pernicious anemia

(f) Water

Water is the primary constituent in the diet as well as in the human body. They are maintaining cellular osmotic balance for metabolic processes, and in the transport and elimination of bodily wastes.

Table 4: Source of nutrients in vegetables (per 100g edible part)

Nutrients	Sources
Energy	Garlic* (142 calorie)
Moisture	Ash/Wax gourd* (96.5 gm)
Proteins	Agathi leaf* (8.4 gm), Pea (7.2 gm), Lima bean, Cowpea
Carbohydrates	Cassava* (32.4 gm), Tapioca, Sweet potato, Potato
Fats	Chekurmanis* (3.2 gm), Drumstick leaf (1.7 gm), Potato, Mature seeds of some cucurbits & Legumes
Fibre	Potato, Chilli, Amaranthus, Palak, Spinach
Vit-A	Curry leaf* (12096 I.U.), Carrot (12000 I.U.), Bathua, Colocasia, Beet, Drumstick
Vit-D	Green leafy vegetables
Vit-E	Veg Oil & Green vegetables like Lettuce, cabbage, Coriander etc.
Vit-K	Kale, Scallions, Cabbage, Spinach, Broccoli
Vit-C	Chekurmanis* (247 mg), Drumstick leaf, Coriander leaf, Chilli, Broccoli, Tomato
Vit-B_1	Coriander leaf* (0.5 mg), Palak, Chilli, Colocasia, Amaranthus, Cabbage

Vit-B_2	Palak* (0.56 mg), Fenugreek, Amaranthus
Vit-B_3	Amaranthus, Palak, Green Chilli, Pea
Vit-B_9	Green leafy vegetables
Calcium	Curry leaf * (830 mg), Chekurmanis (570 mg), Agathi, Amaranthus, Fenugreek
Iron	Chekurmanis* (28 mg), Agathi, Amaranthus
Phosphorus	Garlic* (310 mg), Amaranthus
Potassium	Spinach, Amaranthus
Folic acid	Amaranthus* (149 µg)

*Highest

CONCLUSION

Vegetables have always been an important part of the human diet. The regular intake of prescribed amounts of vegetables by each individual for a healthy life poses a challenge for the scientific community to produce sufficient quantities of vegetables. The Indian Council of Medical Research (ICMR) recommends a daily intake of 300 grams of vegetables to reduce micronutrient deficiencies, heart diseases, cancer, cognitive impairment, and other nutritional health risks. To maximize the nutritional value of your vegetables, choose the right ones based on their nutritional value and adequate amounts.

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