Vitamins

Definition

- Are organic compounds that the body requires in small amounts for its metabolism, yet cannot make for itself, for the most part, they are not related chemically and differ in their physiological role. Their primary function is to promote a wide variety of biochemical and physiologic processes necessary for life.

Classification

- Vitamins are divided into **two groups** on the basis of **their solubility**.

1. **Water-soluble vitamins**
2. **Fat-soluble vitamins**

1. Water –soluble vitamins

are not associated with dietary lipids and fat absorption does not interfere with their own absorption. They are normally excreted in the urine in small quantities. With the exception of vit. B12, they are not stored in appreciable quantity and, there fore, these vitamins have to be supplied frequently to avoid their depletion. The water-soluble vitamins are divided into B-complex group is further separated into the energy releasing vitamins, hematopoietic group and others with miscellaneous functions.

2. Fat-soluble vitamins

A, D, E and K

Are found in foods associated with lipids. They are absorbed from the intestine with dietary fats, so conditions unfavorable to normal fat uptake also impairs their absorption. Because they are lipid soluble, significant quantities of these vitamins can be stored in the body, so they do not have to be consumed every day.

Deficiency

- **Hypovitaminosis is a deficiency disease resulting from inadequate supply of one or more vitamins in the diet. Dietary vitamin deficiencies are still common in some developing countries. The deficiencies usually coincide with alack of basic nutrients. The vit deficiency can be classified as primary or secondary. Primary deficiency is caused by consuming an inadequate diet which can by evaluated by dietary history. In secondary type, the recommended amount may by consumed, but because of some problem (conditioning factors), such as gastrointestinal disorders, malabsorption, medication, allergies, metabolic defects, the nutrient is not efficiently absorbed and/or metabolized. The secondary deficiency can be assessed from clinical history. Regardless of the etiology, the deficiency, if prolonged, leads to a step wise loss of body reserves of the vitamin or vitamins.**
- **Who is at risk for vitamin deficiencies? Chronic deficiency of various vitamins has been associated with cancer, cardio vascular pathology, cataract, arthritis, disorders of the nervous system, and photosensitivity. The very young, the very old, the stressed.**

1. Water soluble vitamins

- **Thiamin—B1:**
- This vitamin acts as a coenzyme in carbohydrate metabolism.
- Food sources: all foods of animal origin and plant tissues contain thiamin. In cereals the vitamin is present mainly in the germ and outer coat of the seed. Much of the vitamin is lost when cereals are milled and refined. All green vegetables, fruits, roots and meat as well as dairy product (except butter) contain significant amounts of the vitamin but none are rich sources.

Deficiency

- the classic disease resulting from vit B1 def in humans is called Beriberi. All cells require thiamin in the co enzyme from for energy metabolism. The most prominent symptoms include: the gastrointestinal disorders (anorexia, indigestion, and weight loss), neurologic disorders and cardio vascular disorders.
- The CNS dependent on glucose for energy to do its work, so without B1 neuronal activity is impaired. The failure of energy metabolism affects neurons and their functions in selected areas of the CNS. Alertness and reflex responses are diminished and general apathy and fatigue result. Depending on the extent of deficiency, lipid synthesis is impaired and damage or degeneration of the myelin sheath follows and causes increased nerve irritation and pain. If the deficiency continues paralysis results.
- Heart muscle weakness cause cardiac failure; smooth muscle of vascular system may be involved causing dilation of peripheral blood vessel and, as a result of cardiac failure, edema appears in the extremities.

Requirement

- The requirement varies with the composition of diet. Since the vit. Participates in the metabolism of energy-yielding nutrients, the requirement is based on the amount of carbohydrate in the diet. The minimum daily adult thiamin needs are 0.23-0.35 mg/1000 Calories. The elderly utilize vit-B1 less efficiently and, therefore, an allowance of at least (1mg) is recommended even their caloric intake may be below 2000 calories. The need for the vit. Increases with the amount of alcohol consumed; this accounts for the increased incidence of beriberi among chronic alcoholics. Fever and infection also increase thiamin needs.
- The foods such as fish, shellfish and a variety of vegetables have a variety of substances such as tannic acid, caffeic acid which are powerful inhibitors of thiamin. Tannic acid is most likely the substance in tea that inactivates thiamin and rapidly induce symptoms of Vit. B1 deficiency.

Riboflavin –B2

- Is a coenzyme in the electron transport system associated with conversion of tissue oxidations into stable energy.
- Food Sources:
- B2 is widely distributed in both plants and animal tissues. The most important food source is milk. Other good sources include egg, liver and green leafy vegetables.
- Deficiency:
- B2 deficiency is not known to be a primary etiologic factor in a major human disease, although patient with beriberi and protein deficiency are generally also deficient in vit B2.

Niacin –B3

- Niacin is required by all living cells as part of the two coenzymes NAD (Nicotinamide adenine dinucleotide) and NADP(Nicotinamide adenine dinucleotide phosphate) which are essential in the metabolism of carbohydrate, fat and protein.
- Food sources:
- Niacin is present in small amounts in most foods; particularly rich sources are cereal grain (e.g. whole wheat), legumes, meat, poultry and peanuts. tea and coffee also can contribute significantly to niacin intake.
- Deficiency:
- Deficiency of niacin causes Pellagra. The disease is classically characterized by the 4 D's—Dermatitis, Diarrhea, Dementia and Death.

Vitamin B12

- **Food sources:**
- **Naturally occurring vit.B12 is synthesized by microorganisms, animals can not synthesized it. This vit. is Unique among the B-group is that it is not present in fruits, vegetable, and grains. Animals get their vitamin by ingesting microorganisms containing vit. B12, and/or the B12 activity of microorganisms high enough in alimentary tract for absorption and storage in tissue (especially liver). The best sources of vit. B12 include meats, seafood, eggs and milk.**
- **Deficiency: the deficiency of vit-B12 can occur because of in adequate dietary intak such as in strict vegetarians, but in most cases the deficiency is secondary to a defect in absorption which can result from disorders affecting the stomach, the intestine and the pancreas. Deficiency of vit-B12 causes a macrocytic, megaloblastic anemia, there leucopenia and thrombocytopenia. The patient appears pale, gloss it is and irritated mucosa, vit-B12 deficiency can cause disorders of nervous system.**
- **Damage to the myelin sheath. This causes a wide variety of neurological and symptoms, including paresthesias of the hands and feet, loss of memory and dementia.**

Vitamin C-Ascorbic Acid

- **Vitamin C has many functions, its protect, regulate, and facilitate the biologic processes of many enzyme systems, act as a reducing agent, and its major function is in the formation of collagen.**
- **Food sources: vit-C is widely distributed in the vegetables and fruits especially citrus fruits, tomatoes, lettuce, green peppers are excellent sources.**
- **Cabbage, cauliflower, spinach and other green vegetables are good sources.**
- **Although low in vit C, potatoes are consumed in such quantities that they become a good source.**
- **Deficiency: the deficiency in vit c results in Scurvy. The signs of the disease in adults include aching Joints, bones and muscle, impaired capillary integrity with subcutaneous hemorrhage, and bleeding gums. Other symptoms are mental depression, hysteria and anemia.**

Thank you