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Review Article

# A General Review on Vitamin World

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## Abstract

Vitamins, are any of the normal blends required by the body in little wholes for absorption, to guarantee prosperity, and for honest to goodness advancement in kids. Vitamins also help the course of action of hormones, platelets, tactile framework chemicals, and innate material. The distinctive vitamins are not artificially related, and most fluctuate in their physiological exercises. They generally go about as stimuli, joining with proteins to make metabolically powerful intensifies that in this way convey numerous essential mixture reactions all through the body. Without vitamins, an expansive number of these reactions would back off or stop. The multifaceted behaviour by which vitamins follow up on the body, however, is as yet far from clear.

**Keywords:** Water-soluble vitamins, Fat-soluble vitamins, Daily recommended intake of vitamin, Stability.

## 1. Introduction

In the early 20<sup>th</sup> century the discovery of vitamins began. Today quite possibly there are a few vitamins that are still undiscovered. Each and every living animals needs vitamins to grow and to be healthy. As long as the human body can't create vitamins naturally or normally deliver the sum required, food nourishes the body with them. There are different vitamins found in different foods. These vitamins give vital nutrients to an animal and human being.[2]

**Definition of VITAMIN according to Merriam-webster:**

Any of various organic substances that are essential in minute quantities to the nutrition of most animals and some plants, act especially as coenzymes and precursors of coenzymes in the regulation of metabolic processes but do not provide energy or serve as building units, and are present in natural foodstuff or sometimes produced within the body.

The 13 especially recognised vitamins are classified according to their ability to be absorbed in the fat or water. The fat-soluble vitamins-A, D, E, and K- are generally consumed along with fat-containing foods, and because

they can be stored in the body's fats, they do not have to be consumed every day. The water-soluble vitamins-the eight B vitamins and vitamin C- cannot be stored and must be expended as often as possible, ideally every day.[3]

## 2. Water-soluble vitamins

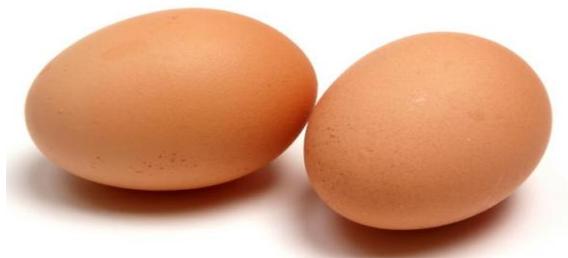
Water-soluble vitamins travel openly through the body, and excess entireties generally are released by the kidneys. The body needs water-soluble vitamins in frequent, small doses. These vitamins are not as likely as fat-soluble vitamins to accomplish harmful levels. However, niacin, vitamin B6, folate, choline, and vitamin C have upper consumption limits. Vitamins B6 at high levels over a long period of time have been seemed to cause irreversible nerve damage.

A balanced diet usually provides enough of these vitamins. People older than 50 and some vegetarians may need to utilize supplements to get enough B12.[5]

### 2.1 Vitamin B

- Chemical name – thiamine
- Water soluble

- Deficiency may cause beriberi and Wernicke-Korsakoff syndrome
- Good source include: yeast, pork, cereal grains, sunflower seeds, brown rice, whole-grain rye, asparagus, kale, cauliflower, potatoes, oranges, liver, and eggs



**Figure 1: Eggs are a good source of vitamin B12.**

### 2.2 Vitamin B1

- Chemical names-cyanocobalamin, hydroxocobalmin, methylcobalamin
- Water soluble
- Deficiency may cause megaloblastic anemia(a condition where bone marrow delivers unusually large, irregular, immature red blood cells)
- Good sources include: fish, shellfish, meat, poultry, eggs, milk, and dairy products, some fortified cereals and soy products, as well as fortified nutritional yeast
- Vegans are advised to take B12 supplements.[4]

### 2.3 Vitamin B2



**Figure 2: Banana a Rich Source of Vitamin B2**

- Chemical name -riboflavin
- Water soluble
- Deficiency may cause ariboflavinosis
- Good sources include: asparagus, bananas, persimmons, okra, chard , cottage cheese, milk, yogurt, meat, eggs, fish, and green bean.[4]

### 2.4 Vitamin B3



**Figure 3: Broccoli belongs to the cruciferous vegetable family and is a good source of vitamins A, B3, and B5.1**

- Chemical names – niacin, niacinamide
- Water soluble
- Deficiency may cause pellagra (characterized by diarrhoea, dermatitis, and mental disturbance)
- Good source include : liver, heart, kidney, chicken, beef, fish (tuna, salmon), milk, eggs, avocados, dates, leafy vegetables, broccoli, carrots, sweet potatoes, asparagus, nut, whole-grains, legumes, mushrooms, and brewer's yeast .[4]

### 2.5 Vitamin B5

- Chemical name – pantothenic acid
- Water soluble
- Deficiency may cause paresthesia
- Good sources include: meat, whole-grains, avocados, broccoli, royal jelly, and fish ovaries.[4]

### 2.6 Vitamin B6

- Chemical names – Pyridoxine, Pyridoxamine, pyridoxal.
- Water soluble
- Deficiency may cause anaemia, peripheral neuropathy
- Good sources include: meat, banana, whole-grains, vegetables and nuts. When milk is dried, it loses about half of its B6. Freezing and canning can also reduce content.[4]

### 2.7 Vitamin B7

- Chemical name – biotin
- Water soluble
- Deficiency may cause dermatitis or enteritis
- Good sources include: egg yolk, liver, some vegetables.[4]

### 2.8 Vitamin B9

- Chemical names – folic acid, folinic acid.
- Water soluble.
- Deficiency during pregnancy is linked to birth defects. Pregnant women are encouraged to supplement folic acid for the entire year before they get pregnant.
- Good sources include: leafy vegetables, legumes, liver, baker's yeast, some fortified grain products, sunflower seeds.[4]

### 2.9 Vitamin C

- Chemical names –ascorbic acid.
- Water soluble.
- Deficiency may cause megaloblastic anemia.
- Good sources include: fruit and vegetables. The Kakadu plum fruit have the highest vitamin C content of all foods. [4]

## 3. Fat-soluble vitamins

Fat- soluble vitamins are secured in the body's cells and are not released as easily as water-soluble vitamins. They do not need to be consumed as often as

water-soluble vitamins, although adequate amounts are needed. If you take too much of a fat-soluble vitamin, it could become toxic. Your body is particularly sensitive to excessive vitamin A from animal sources (retinol) and excessive amount of vitamin D. A balanced diet usually provides enough fat-soluble vitamins. Vitamins A, D, E, and K are fat-soluble.[5]

### 3.1 Vitamin A



**Figure 4: Carrots are a good source of vitamins A and B3**

- Chemical names – retinol, retinal, and four carotenoids (including beta carotene)
- Fat soluble
- Deficiency may cause night-blindness and keratomalacia (an eye disorder that results in a dry cornea). Other signs are excessive skin dryness; lack of mucous membrane secretion, causing susceptibility to bacterial invasion; and dryness of the eyes due to a malfunctioning of the tear glands, a major reason of blindness in children in developing countries.
- Good sources include: liver, cod liver oil, carrot, broccoli, sweet potato, butter, kale, spinach, pumpkin, cheese, egg, apricot, and milk.

Vitamin A is a light yellow primary alcohol derived from carotene. It influences the arrangement and maintenance of skin, mucous membranes, bones, and teeth; vision; and reproduction.

The body obtains vitamin A in two ways. One is by manufacturing it from carotene, a vitamin precursor found in such vegetables as carrots, broccoli, squash, spinach, and sweet potatoes. The other is by absorbing ready-made vitamin A from plant-eating animals. In animal form, vitamin A is found in milk, butter, cheese, egg yolk, liver, and fish-liver oil. Excess vitamin A can interfere with growth, stop menstruation, damage red blood corpuscles, and cause skin rashes, headaches, nausea, and jaundice.[3,4]

### 3.2 Vitamin D

- Chemical names - ergocalciferol, cholecalciferol.
- Fat soluble
- Deficiency may cause rickets and osteomalacia (softening of the bones).
- Good sources: produced in the skin after exposure to UV (ultraviolet) B light from the sun or artificial sources. Also found in fatty fish, eggs, beef liver, and mushrooms.

This vitamin is important for normal bone formation and for retention of calcium and phosphorus in the body. It also protects the teeth and bones against the effects of low calcium intake by making more effective use of calcium and phosphorus. Also called the sunshine vitamin. It is additionally made in the body when sterols, which are commonly found in many foods, migrate to the skin and become irradiated. Vitamin D deficiency, or rickets, occurs only rarely in tropical climates where sunlight is abundant, but it was once common among children of northern cities before the use of vitamin D-fortified milk. Rickets is described by deformities of the rib cage and skull by bowlegs, due to failure of the body to absorb calcium and phosphorus. Because vitamin D is fat-soluble and stored in the body, excessive consumption can cause vitamin poisoning, kidney damage, lethargy, and loss of appetite. [3,4]

### 3.3 Vitamin E



**Figure 5: Almonds are a good source of vitamin E.**

- Chemical names – tocopherols, tocotrienols.
- Fat soluble.
- Deficiency is uncommon. Deficiency may cause hemolytic anemia in newborn (a condition where blood cells are destroyed and removed from the blood too early).
- Good source include: Kiwi fruit, almonds, avocado, eggs, milk, nuts, leafy green vegetables, wheat germ.

The role of vitamin E in the human body is not clearly established, yet it is known to be a basic nutrient in more than 20 vertebrate species. The vitamin plays some role in forming red blood cells and muscle and other tissues and in preventing the oxidation of vitamin A and fats. Vitamin E is broadly advocated for a wide range of diseases, but no substantial evidence has been found to back these claims. Although vitamin E is stored in the body, overdoses appear to have lower toxic effects than do overdoses of other fat-soluble vitamins.[3,4]

### 3.4 Vitamin K

- Chemical names – phyloquinone, menaquinones.
- Fat soluble
- Deficiency may cause bleeding diathesis (an unusual susceptibility to bleeding).
- Good sources include: leafy green vegetables, avocado, kiwi fruit. Parsley contains a great deal of vitamin K.

This vitamin is fundamental basically for the coagulation of blood. It helps in forming prothrombin, an enzyme needed to produce fibrin for blood clotting. The richest sources of vitamin K are alfalfa and fish livers, which are used in making concentrated preparations of this vitamin. For a healthy adult, a normal diet and bacterial synthesis in the bowels usually are sufficient to supply the body with vitamin K and prothrombin. Digestive

disturbances may lead to defective absorption of vitamin K and hence to mild disorders in blood clotting.[3,4]

#### 4. Recommended daily intake of vitamins and minerals

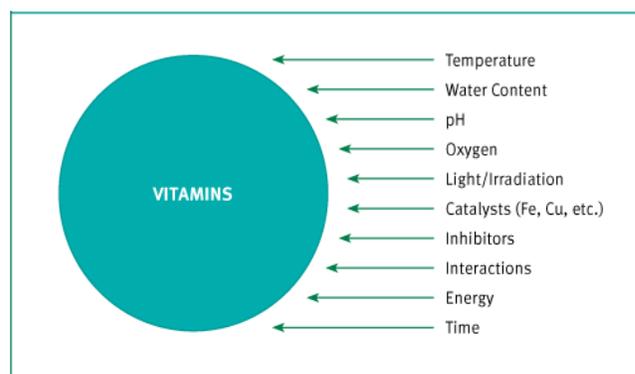
Humans need a certain daily intake of food supplements. This page summarizes recommended daily intakes by various health experts and agencies in order to provide an overview of recommended daily allowances of all vitamins and minerals.[6]

**Table 1: Recommended daily intakes of various food supplements**

Vitamins	Recommended daily intake	Vitamins informational pages	Over dosage (mg or µg/d)
Biotin (B-complex)	30 µg	Biotin in food and as a supplement	No information found
Folate (B-complex)	400µg	Folate in food and as a supplement	Doses larger than 400 µg may cause anaemia and may mask symptoms of a vitamin B <sub>12</sub> deficiency
Vitamin A	600µg	Vitamin A in food and as a supplement	Extremely high doses (>9000mg) can cause dry, scaly skin, fatigue, nausea, loss of appetite, bone and joint pains and headaches.
VitaminB <sub>1</sub> (thamine)	1,4mg	Vitamin B <sub>1</sub> in food and as a supplement	No toxic effects resulting from high doses have been observed
Vitamin B <sub>2</sub> (riboflavin)	1,6mg	Vitamin B <sub>2</sub> in food and as a supplement	Doses higher than 200 mg may cause urine colour alteration
Vitamin B <sub>3</sub> (niacin)	18 mg	Vitamin B <sub>3</sub> in food and as a supplement	Doses larger than 150 mg may cause problems ranging from facial flushing to liver disease
Vitamin B <sub>5</sub> (patothenic acid)	6 mg	Vitamin B <sub>5</sub> in food and as a supplement	Dose should not exceed 1200mg; this may cause nausea and heartburn
Vitamin B <sub>6</sub> (pyridoxine)	2 mg	Vitamin B <sub>6</sub> in food and as a supplement	Doses larger than 100 mg may cause numbness and tingling in hands and feet
Vitamin B <sub>12</sub> (cobalamine)	6 µg	Vitamin B <sub>12</sub> in food and as a supplement	Doses larger than 3000 µg may cause eye conditions
Vitamin C (ascorbic acid)	75 mg	Vitamin C in food and as a supplement	No impacts of over dose have been proven so far
Vitamin D (cholecalciferol)	5 µg	Vitamin D in food and as a supplement	Large doses (>50 µg) obtained from food can cause eating problems and ultimately disorientation, coma and death
Vitamin E (tocopherol)	10 mg	Vitamin E in food and as a supplement	Doses larger than 1000 mg cause blood clotting, which results in increased likelihood of haemorrhage in some individuals
Vitamin K	80 µg	Vitamin K in food and as a supplement	Large doses of one form of vitamin K (menadione or K <sub>3</sub> ) may result in liver damage or anaemia

#### 5. Factors Affecting Vitamin Stability

A number of common physical and chemical factors affect the stability of vitamins. Exposure to multiple stresses generally multiplies the effect on vitamin stability. For example, exposure to moisture through high relative humidity during storage significantly increases the rate at which vitamins are degraded by chemical reactions, such as oxidation.



**Figure 6: Factors Affecting Vitamin Stability**

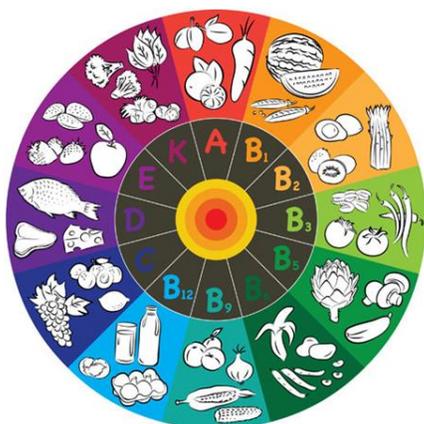
## 6. Common nutrients and their associated health benefits

**Table 2: Common nutrients and their associated health benefits**

Nutrients	Health benefits
<b>Fat soluble vitamins</b>	
Vitamin A	Antioxidant, essential for growth and development, maintains healthy vision, skin and mucous membranes, may aid in the prevention and treatment of certain cancers and in the treatment of certain skin disorders.
Vitamin D	Essential for formation of bones and teeth, helps the body absorb and use calcium
Vitamin E	Antioxidant, helps form blood cells, muscles, lung and nerve tissue, boosts the immune system
Vitamin K	Essential for blood clotting
<b>Water soluble vitamins</b>	
Vitamin C	Antioxidants, necessary for healthy bones, gums, teeth and skin, helps in wound healing, may prevent common cold and attenuate its symptoms
Vitamin B1	Helps to convert food in to energy, essential in neurological functions
Vitamin B2	Helps in energy production and other chemical processes in the body, helps maintain healthy eyes, skin and nerve function.
Vitamin B3	Helps to convert food in to energy and maintain proper brain function.
Vitamin B6	Helps to produce essential proteins and convert protein in to energy
Vitamin B12	Helps to produce the genetic material of cells, helps with formation of red blood cell, maintenance of central nervous system and synthesize amino acids and is involved in metabolism of fats, protein and carbohydrates.

## 7. Vitamin wheel

The US National Library of Medicine says that the best way to get enough vitamins for good health is to follow a balanced diet with a wide range of foods. Some people may need to take a daily multivitamin. Use this easy-to-reference diagram to learn about the vitamin groups and common foods containing them. [4]



**Figure 7: Vitamin Wheel**

## 8. Conclusion

Vitamins divided in two forms – water soluble and fat soluble. The fat soluble vitamins, including A, D, E and K, “are absorbed by the body with the aid of fat and then stored in body fat”. Since, they are stored in this way, we don’t have to take these vitamins every day, and it is usually possible to maintain sufficient amounts in the body through a normal, well-balanced diet.

But for the same reason, it is possible to overdose on these vitamins by taking too many as supplements, in which case they can build up to toxic levels and actually cause harm to the person taking them. The water soluble vitamins, including Vitamin C and all of the B complex vitamins, are “used up quickly or excreted in urine and perspiration; they are not stored and should be consumed daily. They separate rapidly and can be mostly lost through premature harvesting, long and improper storage, processing, overcooking, and cooking in water. The high amounts of both water-soluble and fat-soluble vitamins found in raw vegetables and fruits are often lost when they are processed, with a few exceptions such as carrots, which truly get in vitamin A by being cooked.[1]

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