

# Essential Vitamin and Mineral Nutrients Body Needs and Their Best Food Sources

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## Abstract

Vitamins and minerals are essential nutrients the body needs to work properly and stay healthy. Recovery and repair of body tissues require a host of vitamins and minerals that participate in synthesis of new cells and tissue. For instance, certain vitamins and minerals are required to facilitate the formation of endogenous anti-inflammatory compounds, including Vitamin B6, Vitamin E, Vitamin C, Niacin, Zinc, Selenium and Magnesium. Many vitamins and minerals also serve as antioxidants and help to protect cells against the oxidative damage produced by inflammation. Therefore, this article finds out what these nutrients do, how much of them human needs, how to ensure their get enough and what the risks are if body takes them too much. Vitamins help our body to grow and work in the way it should perform properly. There are 13 vitamins, for example, vitamins C, A, D, E, K and the B vitamins (thiamine, riboflavin, niacin, pantothenic acid, biotin, B6, B12 and folate). Vitamins have different functions in the body, for instance, helping to resist infections, keeping of our nerves healthy and helping of our body to get energy from food, or our blood to clot properly. By following the dietary recommendations, our body can get enough most of these vitamins from food. Minerals also help to our body for its proper functioning. Some minerals, such as calcium, magnesium and potassium, are needed in larger amounts. Others, like iodine and fluoride, are only needed in very small quantities. As with vitamins, if humans eat a varied diet, they will probably get enough of most of minerals. Most people should get all the nutrients they need by having a varied and balanced diet, although some persons may need to take extra supplements at certain times.

## Keywords

Nutrients, Vitamins, Minerals, Food, Diet

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## 1. Introduction

Good nutrition is tied to good health, as well as to the prevention and treatment of many abnormal conditions. Getting the recommended amounts of food each day is an important part of the nutrition equation and nutrients in particular are essential for preventive care. Essential nutrients are compounds that the body cannot make on its own at all or

in enough quantity. The six essential nutrients include carbohydrates, protein, fat, vitamins, minerals and water. Carbohydrates can be grouped into two categories such as simple and complex. Simple carbohydrates are sugars, whereas complex carbohydrates consist of starch and dietary fibre. Protein from food is broken down into amino acids by the digestive system. These amino acids are then used for building and repairing of muscles, red blood cells, hair and other tissues, and for making hormones. The fat in food

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includes a mixture of saturated and unsaturated fats. Animal-based foods such as meats and milk products are higher in saturated fat, whereas most vegetable oils are higher in unsaturated fat. Water is a vital nutrient for good health and the most of our body weight (60-70%) is made up of water. Water helps to control our body temperature, carries nutrients and waste products from our cells and is needed for our cells to proper function (Sarwar et al., 2015; Sarwar, 2017).

Vitamins help to regulate chemical reactions in the human's body. There are 13 vitamins, including vitamins A, B complex, C, D, E and K. Because most of vitamins cannot be made in the body, human must obtain these through the diet. Many people say that they feel more energetic after consuming vitamins, but vitamins are not a source of energy (calories). Vitamins are best consumed through a varied diet rather than as a supplement because there is little chance of taking too high a dose. Minerals are components of foods that are involved in many body functions. For example, calcium and magnesium are important for bone structure and iron is needed for our red blood cells to transport oxygen. Like vitamins, minerals are not a source of energy and can be best obtained through a varied diet rather than supplements (Berdanier et al., 2013; Harris, 2014; Khan et al., 2017). Vitamins and minerals are measured in a variety of ways and the most common are mg- milligram, mcg- microgram and IU- international unit.

## 2. Vitamins and Minerals

Eating of a healthy diet remains the best way to get sufficient amounts of the vitamins and minerals for body needs. Vitamins are organic substances (made by plants or animals), whereas minerals are inorganic elements that come from the soil and water and are absorbed by plants or eaten by animals. Vitamins and minerals are essential nutrients because they perform hundreds of roles in the body. Although they are all considered micronutrients, vitamins and minerals differ in basic ways. Vitamins are organic material and can be broken down by heat, air or acid. Minerals are inorganic and hold on to their chemical structure. We need vitamins in our diets, because human bodies cannot synthesize them quickly enough to meet our daily needs. Our bodies need only tiny amounts of vitamins for proper function. Vitamins A and D can be stored in our liver, while, vitamin C cannot be stored. If human eats more vitamins than need, then these extra are excreted. That means human must eat vitamins regularly. Vitamins are compounds that are essential in very small amounts for supporting of normal body functions. Minerals are just as important as vitamins for supporting of normal physiologic function. There is enough iron in our bodies to make a large nail and

without iron our blood cannot carry oxygen. Without calcium human may have no bones, teeth or muscle contractions (Sarwar et al., 2014; Tayyaba et al., 2017).

### 2.1. Vitamin Nutrients

Vitamins have three characteristics; these are natural components of foods; usually present in very small amounts; they are essential for normal physiologic function (e.g., growth, reproduction, etc.); and when absent from the diet, they will cause a specific deficiency. Vitamins are generally categorized as either fat soluble or water soluble depending on whether they dissolve best in either lipids or water. For instance, nine water-soluble vitamins are Vitamin B1 (Thiamine), Vitamin B2 (Riboflavin), Vitamin B3 (Niacin), Vitamin B5 (Pantothenic acid), Vitamin B6 (Pyridoxine), Vitamin B9 (Folic acid), Vitamin B12 (Cobalamin), Vitamin H (Biotin) and Vitamin C (Ascorbic acid). There are four fat soluble vitamins, for example, Vitamin A (Retinoids), Vitamin D (Calciferol, 1,25-dihydroxy vitamin D), Vitamin E (Tocopherol) and Vitamin K. Vitamins and their derivatives often serve a variety of roles in the body, for example, one of the most important being their roles as cofactors for enzymes called coenzymes (Velisek, 2013).

#### 2.1.1. Vitamin A

Vitamin A is urgent for healthy eyes, and general growth and development, including healthy teeth and skin. Vitamin A is mainly found in sweet potato with peel, carrots, spinach, liver and fish, which are the good sources of this vitamin. An amount of 700 to 900 micrograms (mcg) of vitamin A per day strengthens immunity against infection and helps in vision. Lack of vitamin A can cause night blindness and rough skin. Excess of it can affect the bone, which increases the risk of fractures. Carrots and other orange foods including sweet potato and cantaloupe melons get their hue from the carotene pigment (Berdanier et al., 2007).

#### 2.1.2. Vitamin B Complex

The building blocks for good health come from a variety of foods, even if these are from the same family of nutrients. Such is the case with vitamin B, which is a key player in maintaining of cell health and keeping body energized. Vitamin B complex generally includes vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin/niacinamide), vitamin B5 (pantothenic acid), vitamin B6 (pyridoxine), vitamin B12 (cyanocobalamin) and folic acid. However, some products do not contain all of these ingredients and some may include others, such as biotin, para-aminobenzoic acid (PABA), choline bitartrate and inositol. All B vitamins are referred to as a vitamin B complex, which are class of water-soluble vitamins that play important roles in cell metabolism. Not all types of vitamin B

do the same thing and additionally the different types of vitamin B all come from different types of foods (Combs, 2008).

Vitamins B are good for energy production, immune function and iron absorption. B vitamins help to promote a healthy metabolism and are also linked to a reduced risk of stroke. Certain groups, such as older adults and pregnant women need larger amounts of some types of vitamin B. B vitamins are found in whole unprocessed foods. Processed carbohydrates such as sugar and white flour tend to have lower B vitamin than their unprocessed counterparts. This crucial group of nutrients can be found in whole unprocessed foods, specifically whole grains, potatoes, bananas, lentils, chili peppers, beans, yeast and molasses. Also, these are abundant in green vegetables, whole or fortified grains, dairy and meats (Combs, 1998).

On the way to stay healthy, most people do not need to take a supplement in order to get enough B vitamins. There are plenty of delicious foods available to get all the nutrients our body needs naturally, as long as humans maintain a complete diet of meats, grains, fruits and vegetables. Sometimes over-the-counter supplements are used to prevent their deficiency. Vitamin supplements should only be taken under an advice of a physician. If females are pregnant or over the age of 50, they are more likely to need supplements. Also, supplementation is only a last resort if humans cannot obtain B vitamins through diet or if persons have certain health conditions that warrant their use. The risk of overdose is lower than other nutrients because B vitamins are water-soluble. However, supplements may still cause side effects or long-term health effects or interact with medications that humans take. If humans suspect that they might be vitamin B-deficient, they should contact with physician to have a medical test as well as blood testing (Navarra, 2004).

### 2.1.3. Vitamin C

Vitamin C also known as ascorbic acid is good for strengthening of blood vessels and giving to skin its elasticity, anti-oxidant function and iron absorption. Vitamin C is also good for strong and healthy bones. It heals wound, helps in bone and tooth formations, improves immune system function, increases absorption and utilization of iron, and acts as an antioxidant. If our bodies do not take vitamin C rich food, then these can be a victim of scurvy, causing a loss of collagen strength throughout the body. Loss of collagen results in loose of teeth, bleeding and swollen gums, and improper wound healing. Its excess leads to the formation of kidney stones and persons may even suffer from diarrhoea. Everyone knows this one is frequently found in oranges. Other citrus fruits like lemon, is also known for being source of this vitamin. But, these are not the only source, however

other fruits and veggies packed with vitamin C include guava, red and green peppers, kiwi, grapefruits, strawberries, Brussels sprouts and cantaloupe. Its 75 to 90 mg per day is the right quantity required by our body (May *et al.*, 2007; Ashor *et al.*, 2015).

Vitamin C helps our body to absorb iron from plant sources of food. Poor eating habits or smoking can contribute to low levels of vitamin C. A lack of vitamin C can cause bleeding gums, delay wound healing and contribute to low levels of iron. The most effective way to increase vitamin C is to eat citrus fruits, melons, tomatoes, green peppers and berries. Up to 50% of vitamin C can be lost in cooking and during storage of food. As well as helping to increase iron absorption, vitamin C aids in healing including pressure sores and helps to fight infections. Older people who are not taking these drinks rich in vitamin C, should eat either one orange, half a grapefruit, two satsumas/ mandarins or one kiwi fruit at least three to four times weekly to achieve the recommended intake of vitamin C. This vitamin assists to the body in its formation of collagen, which is needed to heal wounds and repair bones and teeth. It is also needed to make skin, ligaments, blood vessels and tendons, and its antioxidant properties are thought to help in the prevention of heart disease and cancer. Fresh fruits and vegetables are the main source of vitamin C, but supplements can also be taken to keep levels topped up. Its recommended dietary allowance is 60 mg/ day. A glass of freshly squeezed orange juice which contains 40-60 mg/ 100 ml of vitamin C taken daily will achieve the recommended intake. Alternatively, drinks which are rich in vitamin C such as grapefruit juice, fruit drinks with added vitamin C or blackcurrant drinks with added vitamin C can be used (Drouin *et al.*, 2011).

### 2.1.4. Vitamin D

Humans can get vitamin D in three ways, through our skin, from our diet and from supplements. This is often referred to as the sunshine vitamin and its recommended dietary allowance is 7.5 g/ day. Exposure to sunlight is therefore important to promote vitamin D production in the skin, and 15-20 minutes spent out of doors daily during the spring and summer months safeguards against vitamin D deficiency. Vitamin D-rich foods include egg yolks, saltwater fish and liver. Some other foods, like milk and cereal, often have added vitamin D. Apart from spending a few minutes out in the sun, which stimulates vitamin D production, humans can get this nutrient from eggs, fish and mushrooms. As the home bound or inactive older person has reduced exposure to sunlight, dietary intake of vitamin D is important. Margarine and milk can be fortified with vitamin D and should be included in the diet of the elderly person. Liver, eggs and oily fish should also be included regularly (once a week each).

Supplementation with vitamin D to compensate for lack of sunshine may be required if a person is confined indoors for a prolonged period. As vitamin D is a fat soluble vitamin, its excess intake can be toxic. A supplement containing 10 mcg daily is adequate to supplement the diet if exposure to sunlight is poor and food intake is low (Dawson-Hughes et al., 2005; Freedman and Register, 2012).

Vitamin D helps to the body to absorb calcium thus slowing the rate of calcium loss from bones. Vitamin D also protects against bone disease by helping to deposit calcium into bones. Known as the sunshine vitamin, however, dark skinned people do not make vitamin D from sunlight so they must get it from food sources. Food sources of vitamin D include fortified milk and cereals, fish, eggs and spreads. As humans get older, they may need to introduce a vitamin D supplement to their diet as our body may be unable to process it enough from the sunlight and our diet alone. The health experts recommend that people aged 65 and over should take a daily 10 microgram vitamin D supplement. Try to have three servings of vitamin D-fortified low-fat or fat-free milk or yogurt each day. About 15 mcgs of vitamin D rich food items like egg yolk and liver help to form and maintain our teeth and bones. Rickets (long, soft bowed legs), flattening of the back of the skull, osteomalacia (muscle and bone weakness) and osteoporosis (loss of bone mass) are some of the major diseases that one can suffer from, if vitamin D is not taken. Too much of it, leads to slow mental and physical growth, decreased appetite, nausea and vomiting (Cranney et al., 2007; Vieth, 2007; Holick and Hossein-Nezhad, 2017).

### 2.1.5. Vitamin E

Vitamin E is good for blood circulation and protection from free radicals. Vitamin E acts as an antioxidant and protects vitamins A and C, and red blood cells from destruction. So, try to have 15 mcg of vegetable oil like soybean, corn and cottonseed, but egg yolks also contain vitamin E. Vitamin E deficiency is rare and cases of this vitamin deficiency usually occurs in premature infants. Our favourite vitamin enrich food is the mighty almond. Humans can also fill up on other nuts, sunflower seeds and tomatoes to reap the benefits (Abdala-Valencia et al., 2013; Lara et al., 2015).

### 2.1.6. Vitamin K

Vitamin K is good for blood coagulation that is the process by which our blood clots. All leafy vegetables are said to be good for health and may contain vitamin K. Turnip greens, spinach, cauliflower, cabbage and broccoli, soybean oil, cottonseed oil, canola oil and olive oil are all rich in vitamin K (Sarwar, 2013; Sarwar et al., 2013). The vitamin is required for proper blood clotting and just have to take 120 mcg every day. Haemorrhaging can happen if humans do not

include it in their diet. Its overindulgence can lead to vomiting. Leafy greens are the best natural sources of Vitamin K, so make sure to eat lots of kale, spinach, Brussels sprouts and broccoli (Viegas et al., 2008; Shearer and Newman, 2008).

## 2.2. Mineral Nutrients

Most minerals are considered essential and comprise a vast set of micronutrients. There are both macrominerals (required in amounts of 100 mg/ day or more) and microminerals (required in amounts less than 15 mg/ day). There are five macrominerals such as calcium, phosphorus, potassium, magnesium and salt (sodium chloride). There are nine microminerals, for instance, Iron, Zinc, Copper, Chromium, Fluoride, Iodine, Selenium, Manganese and Molybdenum (Bender, 2009). The body needs many minerals called essential minerals, and some of these nutrients and their best food sources are:-

### 2.2.1. Iron

Iron is an essential nutrient in the diet for all age groups. The requirement for post-menopausal females is reduced and the mucosal uptake of iron is independent of age, therefore an iron deficiency anaemia in this group may not necessarily be nutritional in origin. Iron is good for building of muscles naturally and maintaining healthy blood. It might be surprised to know that clams take the top spot for iron content, followed by oysters and organ meats like liver. For the vegetarians among us, soybeans, cereal, pumpkin seeds, beans, lentils and spinach are great sources of iron. One must have beans, lentils, beef and eggs to stay away from anaemia, dizziness or fainting. The recommended daily dietary allowances for men should have 8 mg per day and for women 18 mg per day is sufficient. Low intakes, however, can occur in elderly people living alone, particularly if they do not prepare hot meals. To ensure an adequate iron intake red meat should be taken four times a week. A concentrated source of iron such as black pudding, liver or kidney should also be included in the diet once a week. An adequate vitamin C intake is needed to ensure sufficient iron absorption. Iron can be found in meat, some vegetables and dried fruits. The body uses it to make haemoglobin, which helps to store and carry oxygen in the red blood cells from the lungs to the rest of the body. Without iron in the blood, the organs and tissue receive less oxygen than they usually need and it would lead to tiredness and lethargy (this is known as iron deficiency anaemia) (Hastka et al., 1996; Looker et al., 1997).

### 2.2.2. Calcium

This mineral is another one that most of us at present know, which is essential for healthy teeth and bones. It is also very



important for other physical functions, such as muscle control and blood circulation. Calcium is an essential nutrient for the prevention and treatment of osteoporosis. Despite universal recognition of its importance, most people still do not obtain its recommended amount. Over time, this causes our bones to grow weaker and may lead to osteoporosis, which is a disorder in which bones become very fragile. Recent additions to the treatment of osteoporosis with potent bone active drugs produce an even greater need for calcium and total nutrition for restoration of lost bone. Practitioners and patients need to emphasize and appreciate the role that calcium nutrient plays in the promotion of health, and in the prevention and treatment of disease. Milk, yoghurt, spinach are rich in calcium. About 1000 mg per day of calcium is essential for bone growth and strength, blood clotting, muscle contraction and the transmission of nerve signals. Its best sources are dairy products like yogurt, cheese and milk, along with tofu and black molasses. Other high-calcium foods include kale, broccoli, Chinese cabbage and other green leafy vegetables; sardines, salmon and other soft-bone fish; tofu, breads, pastas and grains; and calcium-fortified cereals, juices and other beverages (Dowd, 2001; Sarwar *et al.*, 2013).

### 2.2.3. Zinc

Zinc is essential for multiple aspects of metabolism. Physiologic signs of zinc depletion are linked with diverse biochemical functions rather than with a specific function, which makes it difficult to identify biomarkers of zinc nutrition. When taken for at least 5 months, zinc may reduce our risk of becoming sick with the common cold. It is needed for the body's defensive (immune) system to properly work. It plays a role in cell division, cell growth, wound healing and the breakdown of carbohydrates. Zinc is also needed for the senses of smell and taste. During pregnancy, infancy and childhood, the body needs zinc to grow and develop properly. Zinc also enhances the action of insulin. Zinc is essential nutrient for good immunity, growth and fertility. Its natural sources are seafood like oysters, which are also zinc-rich, along with spinach, cashews and beans. Animal proteins are a good source of zinc, while beef and lamb contain more zinc than fish. The dark meat of a chicken has more zinc than the light meat. Other good sources of zinc are nuts, whole grains, legumes and yeast (King, 2011).

### 2.2.4. Chromium

Chromium is good for glucose function making sure that every cell in our body gets energy as and when needed. Chromium has also been shown to improve lean body mass in humans. Chromium is an essential nutrient required for sugar and fat metabolism. Normal dietary intake of Cr for humans is suboptimal. The estimated safe and adequate daily

dietary intake for Cr is 50 to 200 µg. However, most diets contain less than 60% of the minimum suggested intake of 50 µg. Insufficient dietary intake of Cr leads to signs and symptoms that are similar to those observed for diabetes and cardiovascular diseases. Supplemental Cr given to people with impaired glucose tolerance or diabetes leads to improved blood glucose, insulin and lipid variables. As long as our diet contains servings of whole grains, fresh vegetables and herbs, we should be getting enough of chromium (Anderso, 1997).

## 3. Conclusion

Many people do not know why vitamins and minerals are so important, but by studying this article someone might better understand their importance. Vitamins and minerals are those nutrients which our body needs in small amounts to work properly and stay healthy. Vitamins and minerals are considered essential nutrients because acting in concert, they perform hundreds of roles in the body. These help to shore up bones, heal wounds and bolster our immune system. They also convert food into energy and repair cellular damage. Most people do not need a complete multivitamin supplement, but if humans think they are not making the best food choices, then look for a supplement sold as a complete vitamin and mineral supplement. It should be well balanced and contain 100% of most recommended vitamins and minerals. Read the label on package to make sure that the dose is not too large. Also, avoid supplements with mega-doses. Too much of some vitamins and minerals can be harmful and persons might be paying for supplements they do not need. Physician might suggest that like some older adults, persons need extra of a few vitamins, as well as the mineral calcium. It is usually better to get the nutrients that our body needs from food, rather than a pill. That is because nutrient-dense foods contain other things that are good for us, like fibre. Look for foods fortified with certain vitamins and minerals, like some B vitamins, calcium and vitamin D. That means those nutrients should be added to the foods to help us for meeting our needs. All these involve in the smallest processes and reactions, but they can produce disorders or diseases if their right amount is not provided in a daily meal. In conclusion, for most of parents, knowing about the roles of different minerals and vitamins is crucial for the wellbeing of their children and themselves.

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