

Vitamin B Complex

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B₁ - Thiamine

B₂ - Riboflavin

B₃ - Niacin

B₅ – Pantothenic acid

B₆ – Pyridoxine

B₇ – Biotin

B₉ – Folic acid

B₁₂ – Cobalamins (cyanocobalamin, methylcobalamin etc.)

Vitamin B Complex

Different chemical structures possessing similar activities –but some different activities as well

Generally found together in the same foods

Water-soluble and do not accumulate in the body

Play role as coenzyme in cell metabolism –energy transformation and other metabolic functions

Essential for healthy nerves, muscles, liver and skin.

Main Sources

Yeast

Liver

Cereal products

Egg

Meat/poultry

Various vegetables and fruits

Vitamin B₁ (Thiamine)

Plays key role in energy production from carbohydrates

Helps digestion, supports growth, and is necessary for healthy functioning of the nervous system, heart and other muscle tissues.

Found in grains (brown rice and whole grains) - but processing of grains remove most of thiamine which leads a very low content or lack of thiamine in white rice, flour and other cereal products.

Essential nutrient for human/animals

Bacteria, fungi and plants can produce thiamine

Function of Thiamine

Cell metabolism and energy production

- Phosphate derivatives are active forms (especially TPP)
- Plays role in energy production from carbohydrates and storage of blood sugar as fat in the body

Functions of nerves and muscles

- Necessary for the function of peripheral nerves and maintenance of muscle tone

Thiamine Deficiency

Mainly seen in cases of chronic alcoholism, HIV/AIDS, diabetes, intake of diuretics at high doses

Depression, malaise and confusion which may be attributed to the role of thiamine in glucose metabolism

Anorexia, digestive disorders such as constipation.

Destruction of myelin sheath, which is the protective coat of axons in neurons, leading to irritation and inflammation in neurons causing numbness, tingling and pinching and pain.

Thiamine Deficiency

Dysfunction of the nerves causes loss of muscle tone, weakness, weakened coordination, and difficulty in walking.

Beriberi disease which is characterized by nerve inflammation and pain, muscle weakness and lack of coordination, edema and heart condition

Main Sources

Whole grain

Unprocessed rice

Meat

Vegetables, fruits

Legumes

Seafood

Yeast

Main Sources

Dietary supplements are available as OTC products.

Found as Thiamine-HCl or Thiamine-nitrate in dietary supplements.

Allithiamine: lipid-soluble form of thiamine (*Allium sativum*)

Thiamine Need of the Body

Age/Period	Daily Dose (mg)
0-6 months	0.2
7-12 months	0.3
1-3 years	0.5
4-6 years	0.6
7-9 years	0.9
10-18 years (female)	1.1
10-18 years (male)	1.2
19 + years (female)	1.1
19+ years (male)	1.2
Pregnancy	1.4
Lactation	1.5

Thiamine Need of the Body

Physical/emotional stress quickly depletes thiamine stores.

Fever and other disease symptoms increase the need for thiamine and other B complex vitamins.

It is recommended that the daily intake of thiamine in proportion to the other B complex vitamins should be 100-500 mg in cases of stress, disease or postoperative recovery.

Alcohol causes thiamine destruction. 50-100 mg of thiamine intake is needed in case of consumption of 1 to 2 alcoholic beverages daily.

Thiamine Need of the Body

Mood disorders such as mild depression, anxiety may be induced by thiamine deficiency. In such cases, it is reported that thiamine intake of 50-100 mg daily improves the mood and increases mental alertness and energy.

Individuals, 60% of whose daily diet consists of carbohydrates are recommended to take 50 mg thiamine daily.

It is reported that thiamine intake at 50 mg daily dose for 3 months in patients over 65 years has led to a moderate decrease in blood pressure, improvement in sleep quality and mood.

Congestive heart failure

Contraindications

No toxic effect is reported for oral intake.

Tolerable upto 200 mg daily dose orally.

Anaphylaxis may be seen in case of thiamine injections.

A daily average dose of 3 mg should not be exceeded in pregnancy and lactation periods.

Interactions

Long-term use of diuretic drugs such as furosemide, ethacrynic acid, bumetanide causes thiamine deficiency.

Regular consumption of tea and coffee decreases the absorption of thiamine due to their tannin content.

Thiamine is degraded by long-term exposure to oxygen, high temperature, sulfites used as food preservatives and alkali substances.

Vitamin B₂ (Riboflavin)

Has important role in food metabolism along with thiamine and niacin

A flavoprotein which acts as a coenzyme for the energy metabolism and redox reactions

It converts all foods such as carbohydrates, proteins and fats into the form of energy that the body can use

It activates and transforms niacin to a form which the body can utilize.

Vitamin B₂ (Riboflavin)

Riboflavin increases the protective effect of vitamin E from free radicals (antioxidant activity).

Partially has a role in thyroid hormone functions.

Necessary for the production of hormones (especially cortisone) in adrenal glands

Light-sensitive component, milk which is the richest riboflavin source loses 75% of its riboflavin content when left in the cup for 1-2 hours.

Riboflavin Need of the Body

Age/Period	Daily Dose (mg)
0-6 months	0.3
7-12 months	0.4
1-3 years	0.5
4-8 years	0.6
9-13 years	0.9
14-70 years (female)	1.1
14-70 years (male)	1.3
70 + years (female)	1.3
70 + years (male)	1.6
Pregnancy	1.4
Lactation	1.6

Riboflavin Need of the Body

Daily requirement 1-2 mg depending on the metabolic rate and daily caloric intake

The need for riboflavin increases in physical and emotional stress. 100-250 mg per day induces healing and reduces the harmful effects of emotional stress.

It is recommended that other B complex vitamins should be taken in an increased amount in case of stress.

Especially elderly people who don't consume milk are recommended to take vitamin B complex intake.

As the consumption of riboflavin per day increases for athletes, 50-100 mg intake is recommended.

Main Sources

Milk

Yogurt

Cheese

Egg

Meat

Vegetables

Grains

Riboflavin Deficiency

Riboflavin deficiency may be seen in the patients with chronic liver disease, alcoholism as well as the ones who are fed only parenterally.

In case of riboflavin deficiency some symptoms, such as anemia, fatigue, slow healing of cuts and wounds, mouth sores and inflammation, eye problems (such as corneal inflammation), partially oily and problematic skin (seborrheic dermatitis) etc. may be encountered.

Riboflavin Deficiency

It was determined that antibody production decreased in case of riboflavin deficiency.

It is necessary for the maintainment of red blood cells which carry oxygen in the body, thus deficiency leads to anemia.

Riboflavin is a component of the retinal pigment which detects the changes in the light, therefore photosensitivity occurs in case of riboflavin deficiency.

Vitamin B complex preparations are preferred in treatment because riboflavin avitaminosis is usually accompanied by deficiency of other B vitamins.

Use of Riboflavin

The intake of 25-100 mg/day provides prevention from cataract formation or slows down cataract development.

Use at daily dose of 400 mg reduces the severity and frequency of migraine headache.

Ischemia-induced cardiac problems

Interactions

Oral contraceptives; 100 mg/day riboflavin should be taken to eliminate deficiency

Riboflavin absorption increases in case of hypothyroidism and vice versa.

Colestyramine, colestipol, metoclopramide decrease riboflavin absorption.

Chlorpromazine, doxorubicine and tricyclic antidepressants inhibit transformation of riboflavin to riboflavin monophosphate and flavin adenine dinucleotide which are coenzymes in redox reactions.

Adverse Effects

Intake at a dose of 400 mg/day longer than 4 months causes diarrhea and diuria.

Paints the urine in yellow.