



Vitamin K	0.9 mcg
Thiamin	0.5 mg
Riboflavin	0.5 mg
Niacin	5.3 mg
Vitamin B6	0.5 mg
Folate	273 mcg
Vitamin B12	1.7 mcg
Pantothenic Acid	0.3 mg
Choline	7.3 mg
Betaine	9.7 mg

Vegetarian Nutrition

a dietetic practice group of the



Academy of Nutrition and Dietetics

RDN Resources for Consumers:

Vitamin B12 in Vegetarian Diets

Vitamin B12 is an essential nutrient required for the synthesis of all blood cells, proper functioning of the nervous system, DNA synthesis, and a variety of other biological functions. Vitamin B12 deficiency or insufficiency is high in vegetarians regardless of the type of vegetarian diet they consume, with the highest rates of deficiency found in vegans.

How common is vitamin B12 deficiency among vegetarians and vegans?

Vitamin B12 deficiency among vegetarians depends mainly on the type of vegetarian diet individuals adhere to. Vegan individuals have the highest risk and more of them develop a deficiency, compared to vegetarians, while deficiency among vegetarians, although also wide-spread, is less prevalent.

Individuals in certain stages of life have a higher risk of vitamin B12 deficiency. Absorption of vitamin B12 may be impaired in some older adult vegetarians due to age-related changes in the gastrointestinal track. Pregnant and lactating vegetarian women and their offspring are at a high risk of deficiency due to physiological and anatomical changes and higher demand for nutrients during these stages of the life cycle.

What are the symptoms of B12 deficiency?

Symptoms of vitamin B12 deficiency may include fatigue, tingling, feeling of pins and needles in the fingers and the toes, decline in brain function often manifested in speech and memory impairment, and disturbance in the function of the nervous system that may be exhibited by inability to maintain balance, disorientation, reckless and agitated behavior, social withdrawal, decreased interest, and apathy.

When infants and toddlers develop vitamin B12 deficiency, they experience large developmental delays, manifested in both physical (e.g. inability to sit and/or walk alone, weight loss or lack of weight gain, falling off the growth curve) and neurological (e.g. anorexia, involuntary movements, delays in speech development) abnormalities. These consequences can sometimes last into adulthood.

Infants may develop vitamin B12 deficiency when their mother was deficient while pregnant or breastfeeding. The

risk is especially high for infants born to, and breastfed by, vegan mothers who have not been using a reliable vitamin B12 source, such as oral vitamin B12 supplements.

Inadequate vitamin B12 level is a cause of elevated homocysteine. Elevated homocysteine ($> 10 \mu\text{mol/L}$) is a risk factor for a variety of health problems, including cardiovascular disease, brain atrophy, and osteoporosis.



Top 3 common myths about vitamin B12

Several myths regarding vitamin B12 are wide-spread. They include:

1. Bacteria in the mouth and/or GI track synthesize adequate amounts of this vitamin and, thus, there is nothing to worry about. If this was the case, vitamin B12 deficiency would be an uncommon problem.
2. Adequate vitamin B12 can be obtained from fermented soy products, probiotics, and algae, such as spirulina. Fermented soy products (e.g. miso, tempeh) and probiotics do not contain sufficient vitamin B12. There is conflicting research regarding the content of this vitamin in spirulina and other algae types. Nonetheless, these products are not considered to be a reliable vitamin B12 source.
3. It takes many years, perhaps 10 or 20, before vitamin B12 deficiency can occur. In fact, vitamin B12 deficiency can develop relatively quickly after switching to a vegetarian, mainly a vegan, diet.

How much vitamin B12 should you include?

Findings from recent research studies have shown that more vitamin B12 is needed than what was believed in the past. The newest recommendations call for intake of 4.0 µg/day in adults, 4.5 µg/day during pregnancy and 5.0 µg/day while breastfeeding. It is difficult to obtain adequate intake of vitamin B12 from foods that naturally contain this vitamin (e.g. dairy products, eggs). This is because these items contain relatively small amount of vitamin B12 (e.g. 1 cup of milk contain less than 1 µg/day, while other dairy products contain even smaller amounts). Thus, foods that are fortified with vitamin B12 should be selected regularly. Using vitamin B12 supplements is the easiest and most reliable way to prevent the development of deficiency.

What foods have been fortified with vitamin B12?

Several cereal products, fortified with B12, constitute a good source of vitamin B12. Additionally, some brands of nutritional yeast are fortified with vitamin B12. A variety of soy products, including soymilk, tofu and meat alternatives may be fortified. It is important to read labels as not all cereals, meat alternatives, soymilks, and nutritional yeast are fortified with B12, and the amount of fortification can change.

A variety of infant formulas, including, but not limiting to, soy-based formulas, have been fortified with vitamin B12. Formula-fed infants may require a B12 supplement if the mother does not have an adequate supply of B12.

Which vitamin B12 supplements should you use?

Vitamin B12 supplements are available in pharmacies, grocery, and health food stores. They may contain a different form of the vitamin (e.g. cyanocobalamin, methylcobalamin) and/or a different dose of the vitamin. Vegetarians and vegans should consult with a Registered Dietitian Nutritionist regarding the most appropriate vitamin B12 supplement.

Are there any other sources of vitamin B12?

Several, relatively new, products have been fortified with vitamin B12. They include kombucha, some energy drinks, vitamin water, vitamin B12 energy shot, protein powders, and shakes. Intake of some of these products, such as energy drinks, have been linked with adverse health outcomes and even death. Also, research regarding these

products' impact on vitamin B12 level is lacking. Thus, some of these products should be avoided, while it is unclear whether the others can be recommended as vitamin B12 sources.

Important recommendations for vegetarians and vegans

- If you are a vegetarian, especially a vegan, you should ingest a reliable vitamin B12 source, such as fortified foods or supplements.
- Ask your doctor if your vitamin B12 level should be checked on an annual basis.
- Regularly use foods fortified with vitamin B12 and/or take vitamin B12 supplements.
- Ensure your vitamin B12 is adequate prior to becoming pregnant, during pregnancy, and while breastfeeding.
- Older vegetarians, especially vegans, may need higher doses of B12 due to age-related absorption problems.
- Higher doses may be needed for individuals who are already deficient.

Consulting a Registered Dietitian Nutritionist

A **registered dietitian nutritionist** can help you develop a healthy vegetarian eating plan that meets your needs. To find an RDN in your area, visit <https://vegetariannutrition.net/find-a-registered-dietitian/>.

