Multivitamins: Supplements or Substitutes?

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Audience: Americans who take multivitamins
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Introduction

Vitamin deficiency research began in the early 1900s with William Fletcher. He discovered that eating unpolished rice instead of polished could prevent beriberi (thiamin deficiency), which is characterized by mental confusion, muscle impairment, and increased heart rate. From here, research increased, eventually leading to the development and public release of the multivitamin in the 1930s (1). Since then, multivitamins have risen in popularity among Americans.

The Dietary Supplement Health and Education Act (DSHEA) of 1994 defines a dietary supplement as “a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet. The "dietary ingredients" in these products may include: vitamins, minerals, herbs or other botanicals, amino acids, and substances such as enzymes, organ tissues, glandulars, and metabolites" (2). Multivitamins, in particular, contain both vitamins and minerals (micronutrients) and have been used for many reasons including eliminating deficiencies and supplementing a diet that may not provide adequate vitamins and minerals. However, some supplements include over 100% of the recommended dietary allowance (RDA), which could be detrimental to one’s health.

Within the past few decades, multivitamins have become more of a nutritious food substitute rather than a vitamin supplement for Americans. This problem brings about the question, “How do people misuse multivitamins and what are the effects of this?” The purpose of this report is to answer this question and give an overview of the reasons multivitamins are misused. In this literature review, you will find information
about common multivitamin use, misconceptions about multivitamins, toxicity and bioavailability of vitamins and minerals, and proper usage of multivitamins.

**Common Multivitamin Use**

Multivitamins are taken by many people for both health reasons and to simply supplement their every day diets. About 58% of Americans take multivitamins daily to prevent illness and disease, and these supplements are also frequently prescribed by physicians (3). People with vitamin or mineral deficiencies, such as a vitamin D deficiency, may be prescribed vitamin supplements by a doctor. Pregnant women may be prescribed to take prenatal vitamins, which have the higher levels of folate, calcium, and iron that they need to provide for their fetus. Some elderly who are inactive or have lost interest in eating may also be prescribed multivitamins that include vitamin D and calcium. Finally, children who are picky eaters or who drink water without adequate fluoride to protect tooth enamel may be prescribed a multivitamin or fluoride supplement (4). People who are trying to “bulk up” or lose weight may also try certain advertised multivitamins or other supplements. Clearly, many people consume multivitamins; however, the reasons for taking them are numerous.

**Misconceptions**

Although multivitamins can be beneficial to certain populations, many Americans have a misunderstanding of the roles of multivitamins in the body and their effects. A common misconception is that multivitamins can prevent disease. For example, it was believed that vitamin E supplementation may prevent cancer, but a randomized trial from the Women’s Health Study found that there was no prevention of cancer from vitamin E supplements on women older than 45 (3). Furthermore, some studies have shown that
supplementation of certain vitamins actually increase risk for certain illnesses and diseases. For example, emerging evidence suggested that high levels of beta carotene (vitamin A) may prevent certain cancers and/or heart disease. However, a study conducted with people who smoke in Finland resulted in a higher incidence of lung cancer in those supplemented than those not supplemented in the placebo group (3).

Another misconception is that any multivitamin on the market must be safe. This is not the case, since the FDA has little regulation over dietary supplements. As a result, they do not control the information on the supplement label. Therefore, supplements may include unhealthy levels of certain vitamins and/or minerals, and the FDA can only remove the product if it has been proven unsafe or if consumers have gotten sick from the product (5).

Finally, there is a misconception that one can substitute multivitamins for a healthy diet with no repercussions. Although there are usually more vitamins and minerals in a multivitamin than a single food item like spinach, for example, this does not necessarily mean that it is more beneficial to consume the multivitamin over the spinach. David Grotto, a Registered Dietitian and spokesperson from the American Dietetic Association (ADA) said, "Foods are so complex, offering not only vitamins and minerals, but fiber, nutrients(carbohydrates, proteins, and fats), phytochemicals (naturally occurring properties in plants that may act as antioxidants to prevent cancer), and a whole host of nutritious substances that science has not fully identified that work together with other foods and provide the benefits of a healthy eating pattern" (6). Fat, carbohydrates, and protein are essential nutrients, meaning that humans need them to survive. Therefore,
if people ate nutritious foods containing essential nutrients, vitamins, minerals, fiber, and phytochemicals, there would be no need for multivitamins.

From these reasons, one can see that there are many misconceptions about the safety of multivitamins and their roles in the human body.

**Toxicity and Bioavailability**

Although many view multivitamins as harmless, high levels of certain vitamins and minerals can be dangerous. Iron, for example, is a toxic metal that can only be excreted from the body through blood loss. Humans do need some dietary iron (8mg/day for men and 16mg/day for women), but intakes above the RDA could pose as threats to one’s health and possibly cause iron toxicity, or hemochromatosis, resulting in an enlarged liver, fatigue, and joint diseases (7). Fat soluble vitamins (vitamins A, D, E, and K) are among the most dangerous to consume toxic levels of because they are stored in the body, whereas if one consumes too much of a water soluble vitamin like thiamin, the excess will flush out of the body in urine. The most common vitamin and minerals that have been taken to excess by Americans include vitamin A, vitamin C, niacin, iron and zinc (6). Since most Americans do not read the dosage of vitamins and minerals on the bottle of multivitamins, they may be receiving toxic amounts of these micronutrients and not even know it.

Another concern is the bioavailability of vitamins and minerals in supplements. Bioavailability, or the amount of the vitamin or mineral that is actually absorbed from a dose, varies depending on many factors including inorganic verses organic forms of the vitamin. Furthermore, vitamins interact with each other when taken together, which can
increase or decrease their bioavailability. For example, taking inorganic iron and vitamin C together may increase the bioavailability of iron. Low levels of magnesium and calcium may also increase iron bioavailability. However, if a multivitamin contains both calcium and phosphorus, for example, the bioavailability of both decreases because they compete with each other for absorption in the body (8). Therefore, by taking a supplement with about 100% or more of the RDA of dozens of vitamins and minerals, one may be disrupting the absorption process of certain micronutrients. As a result of this naiveté, many Americans are unaware of the hazards of overconsumption of certain vitamins and minerals, as well as factors influencing the bioavailability of these.

**Proper Use of Multivitamins**

Before deciding to take multivitamins, one should consult his or her physician. If a person purchases multivitamins when they are not needed, he or she could be wasting money, since supplements can be very expensive. Furthermore, one should never take supplements that contain multiple times the RDA of vitamins and minerals. This could lead to toxicities and possibly even death. People should always buy multivitamins from a trusted source. Andrew Shoa, PhD, vice president for regulatory affairs for the Council for Responsible Nutrition says, “Another tip: read the claims carefully. If they look too good to be true, they probably are” (6).

If used properly, multivitamins can be a safe supplement, but people should ask a physician before spending money on supplements that may be doing more harm than good in their bodies.
Conclusion

There are many answers to the question: “How do people misuse multivitamins and what are the effects of this?” Multivitamins, although very helpful for people with certain medical conditions, are often misused by the general public. Many Americans may be under the false impression that many vitamins can prevent cancer, when in fact, more research is needed. Toxicity of certain micronutrients is also a problem with supplements, and can be achieved easily without even knowing, while the combination of certain vitamins and minerals affect each others' bioavailability in the body. A possible solution to this specific problem could be to educate more Americans about micronutrients.

In conclusion, one should consult a doctor before taking a vitamin supplement to prevent reaching toxicity and wasting money. Multivitamins may be a great supplement to a healthy diet, but Americans should realize that they should never substitute nutrient-dense foods.
Sources:


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