

A Review on Some Common Synthetic Vitamins

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Abstract

In broad senses, vitamins are two types- natural and artificial. Based on mode of action on various organs of human body, we found lots of vitamins. Among them, vitamin A, B complex, D, and vitamin E are commonly used artificially. In old ages, and emergency basis, there is no alternative of taking supplementary vitamins. Twenty-eight published articles were carried out for reviewing this composition as a whole. In this modern era, all types of synthetic vitamins are commercially available in markets but experts always suggest ensuring natural, ideal, and balanced diet for proper fitness. Only overdose of synthetic vitamins could make adverse serious effects in human body.

Keywords: Synthetic vitamins • Supplementary vitamins • Overdose • Importance • Fitness

Introduction

Journal of Clinical Oncology (2022) mentioned some health risks for taking supplementary vitamins. American Cancer Research Institutes and the National Taiwan University found evidence to suggest that long-term and high-dose of vitamin B6 and B12 increased risk of lung cancer in men who regularly smoked. High-doses of vitamin B6 can also cause lower blood pressure. Cheap multivitamins have similar amounts of magnesium, vitamin k, folate, vitamin B12, iron, boron, vitamin E, and vitamin D. Annals of Internal Medicine looked at 27 trials of vitamins involving more than 400000 people and revealed that people who took vitamins did not show higher longevity or lower cases of heart disease or cancer than people who did not take them. American Medical Association studied on nearly 6000 men into four supplements, results showed no decreased prevalence of dementia among the supplements-taking groups. Several types of antioxidant supplements beta carotene, vitamin A, and vitamin E may increase mortality [1]. Vitamins are not the sources of energy but act as regulators of metabolic processes [2]. A primary deficiency of vitamin occurs when there are no enough vitamins in food, and secondary deficiency may be due to underlying disorders [3]. Overdose of vitamins has documented adverse reactions with severity [4]. A review of 14 randomized trials (2004) for the Cochrane database found that the supplemental vitamins A, C, E and beta-carotene, and selenium prevents intestinal cancers, and actually increased mortality. In addition, another review of 19 trials (2005), in the 'Annals of Internal Medicine', of nearly 136000 people with supplementary vitamin E increased mortality. A study (2011) showed the increased risk of heart failure in diabetic patient, and other study under the Journal of American Medical Association mentioned the increased risk of prostate cancer. In 2008, on 68911 individuals, American Association of Poison Control Centers noticed that overdose of vitamins under age six, lead to major life-threat without the death record [5]. There was a case report of life-threatening eosinophilic pleuroperipheral effusion in woman who took a combination of biotin and pantothenic acid for two months [6]. Liver injuries are happened from weight loss and bodybuilding supplements (catechins (green tea), anabolic steroids, and aegeline (herbal product) [7]. Weight loss

supplements have also had adverse psychiatric effect [8]. The objective of this review to analyze the result after using the synthetic vitamins (Table 1).

Table 1. Some features and references on vitamins

Features	Examples	Relevant References
Studies on vitamin supplements	There are many research studies on vitamins	Brodwin, 2017
Metabolic process	Vitamins are important for regulating metabolic processes	Lutz & Przytulski, 2011
Deficiency disorders	Deficiency disorders of vitamin are common in human	Johnson, 2012
Overdose of vitamins	Overdose of vitamins have serious effect	Said et al., 1998; Trumbo et al., 2001; Bronstein et al., 2008
Bodybuilding supplements	Bodybuilding supplements could enhance liver injury	Bersani et al., 2015; Navarro et al., 2017
Vitamin A	Huge intake of vitamin A causes fetal deformities	Myhre et al., 2003; Huiming et al., 2005; Penniston & Tanumihardjo, 2006; Malvasi et al., 2009
Vitamin B2	Vitamin B2 is helpful for heart and brain	Jernigan, 1985; Silva et al., 1991; Kale et al., 1992; Boehnke et al., 2004; Gropper et al., 2009
Vitamin B3	Synthetic vitamin B3 has many side effects	Morgan et al., 1998; Landray et al., 2014; Korah et al., 2017
Vitamin B5	May increase the requirement for pantothenic acid	Flodin, 1988
Vitamin B6	May cause seizures in neonates	Hunt et al., 1954
Vitamin B9	May not help protect against colon polyps	Staff Reuters, 2012
Vitamin B12	Metformin decreases vitamin B12 and folic acid levels	Wulffele et al., 2004
Vitamin C	Sometimes, it influences kidney stones	Sauberlich, 1994; Curhan et al., 1996;
Vitamin D and Calcium	Causes over-calcification	Heart Protection Study Collaborative Group, 1999
Vitamin E	In fact, it has no remarkable adverse effects on human body	Dionne et al., 2012
		Higdon, 2004

Literature Review

Commonly used synthetic vitamins with their effects

Retinol (vitamin A): Vitamin A has often exceeded the recommended dietary allowances for adults, especially in developed countries, which show evidence of sub-toxicity without clinical signs. Osteoporosis and hip fracture are associated with preformed vitamin A intakes that are only twice the current recommended dietary allowances. Large intakes of vitamin A consumed by pregnant women lead to fetal deformities including small or no ears, abnormal or missing ear canals, brain malformation, and heart defects. In the deficiency of vitamin A in children, WHO recommends two daily doses of this vitamin. A practice associated with a reduced risk of mortality in children younger than two years old [9-11].

Riboflavin (B2): Overdose of thiamine by injection causes convulsions, cardiac arrhythmias, and anaphylactic shock. An earlier study reveals that riboflavin could reduce migraine attacks [12,13]. Riboflavin and light produce toxic peroxides [14,15], and riboflavin-tryptophan causes liver and cell damage [16].

Niacin (B3): Adverse effects related to gastrointestinal, musculoskeletal, skin, and diabetes is also reported for niacin supplement [17]. Muscle pain, gout, infections, and brain bleeds were also common by using this niacin.

Pantothenic acid (B5): Oral contraceptives that contain estrogen and progestin may increase the requirement for pantothenic acid [18].

Pyridoxine (B6): Deficiencies of vitamin B6 may cause seizures in neonates [19].

Folic acid (B9): Taking extra folic acid may not help protect against colon polyps [20].

Cobalamine (B12): A study shows that metformin decreases vitamin B12 and folic acid levels [21].

Ascorbic acid (C): Ascorbic acid is structurally related to glucose and it is a weak sugar acid. This vitamin has some toxicity reports [22]. An epidemiologic investigation of vitamin C intake reported a relationship with an increased risk of cardiovascular disease in postmenopausal women with diabetes. Some case studies reported unusually high intakes of vitamin C, especially for those who received vitamin intravenously or who are suffering from chronic renal failure, resulting in the development of oxalate kidney stones [23].

Vitamin D and calcium: Around 90% of the vitamin D is obtained from sunlight, this vitamin is biologically inactive but for activation, it needs enzymatic conversion in the liver and kidney. An excess of vitamin D causes abnormally high blood concentrations of calcium which can cause over-calcification of the bones, soft tissues, heart, and kidneys. In addition, hypertension can happen [24].

Tocopherol (E): People with diabetes and history of heart attack and stroke should avoid high doses of vitamin E. It might increase recurrent attack of cancer. There are no serious adverse effects have been reported with vitamin K [25-28].

Conclusion

Any emergencies, only by registered physicians could recommend the necessity of synthetic vitamins. Government officials, health professionals, scientists, researchers, and universities personnel could enhance adequate research on natural and artificial supplements. Knowledge about human body, food-habit, and exercise helps keep sound without taking such supplementary vitamins.

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