

Utilization and Safety of Common Over-the-Counter Dietary/Nutritional Supplements, Herbal Agents, and Homeopathic Compounds for Disease Prevention



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KEYWORDS

- Dietary supplement • Over-the-counter (OTC) supplements • Herbal
- Micronutrients • Homeopathic compound • Drug interactions
- Regulation of dietary supplements

KEY POINTS

- Available evidence supporting the use of dietary supplements varies based on the supplement and the indication for which it is being used.
- This review highlights several disease states and the available evidence regarding dietary supplement use.
- Manufacturers, rather than the US Food and Drug Administration, are responsible for evaluating the safety and labeling of dietary supplements before marketing.
- Clinicians need to remain abreast of emerging evidence and recommendations regarding the use of dietary supplements.

INTRODUCTION

The Dietary Supplement Health and Education Act of 1994 (DSHEA) classifies dietary supplements as vitamins, minerals, herbs or other botanicals, and amino acids intended to supplement diet.¹ Manufacturers are responsible for evaluating the safety and labeling of their products before marketing to ensure it meets DSHEA

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regulations.^{2,3} Recent data suggest almost one-third of US children and adults use health supplements.^{4,5} Given that there are more than 55,000 supplements and micronutrients, a detailed assessment of preventive efficacy of all available products is beyond scope of this review. This article reviews available evidence for dietary supplements in select disease categories. Readers are referred to the Natural Medicine comprehensive database (<http://www.naturaldatabase.com>) and the Cochrane database for in-depth reviews.

DISEASES OF ALLERGY AND IMMUNOLOGY

Over the past 20 years, the prevalence of allergies in industrialized countries has increased 5-fold, from approximately 4% to an estimated 20%.⁶ Allergic diseases include food allergies, atopic dermatitis (eczema), asthma, and allergic rhinitis (hay fever). There is growing evidence that rising propensity for allergy and inflammation may be programmed in very early life. This evidence has led to widespread use of complementary therapies with the expectation for improvement in childhood atopy and asthma.⁷

Fish oils are major sources of omega-3 long chain fatty acids (ω -3 fatty acids). ω -3 fatty acids can reduce plasma triacylglycerols (triglycerides) and increase high-density lipoprotein cholesterol. Fish oils have also been shown to lower blood pressure and improve vascular reactivity.⁸ Dietary reduction in ω -3 fatty acid intake over the last 20 to 30 years coincides with a dramatic increase in the incidence of asthma and allergic diseases. Anti-inflammatory properties of ω -3 fatty acids can inhibit allergic inflammatory and immunoglobulin E (IgE)-mediated immune responses, especially when given early, before the establishment of allergic immune response *in vitro*. This plausible mechanism resulted in widespread use of ω -3 supplementation in pregnancy with the aim to reduce neonatal allergic diseases. However, maternal supplementation of ω -3 fatty acids failed to show a decline in incidence of IgE-mediated allergic rhinitis or IgE-mediated asthma.^{8,9}

Throughout evolution, microbial genes and metabolites have become an integral part of human physiology, metabolism, and immune responses. Rapid urbanization, widespread antibiotics use, commercial agricultural practices, environmental pollutants, highly processed foods/beverages, and socioeconomic disparities are all implicated in compromising a vast and individually distinct residential microbial community in humans, collectively known as human microbiome. Alteration of the human microbiome and decline in intestinal biodiversity may result in defective or inadequate immune responses.¹⁰ Early observations suggest that reduced intestinal biodiversity may be a fundamental factor in rising propensity of allergic and some inflammatory diseases. The use of mixed strain probiotics (eg, combination of lactobacilli, bifidobacteria, and other probiotic organisms) has been explored with an aim to repopulate intestinal microbial biodiversity.^{7,10,11} A review of studies that used rigorous methodologies do seem to indicate that maternal probiotic use may decrease the incidence of eczema in high-risk infants.⁷ Similar benefits, however, were not shown with other allergic conditions. Hence, the recommendation to use probiotics for atopic conditions should be very restrictive.

The use of vitamin C, bitter orange, ephedra, and grape seed extracts for allergic rhinitis are probably ineffective and may even be harmful. Bitter orange and ephedra are used as dietary supplements and as appetite suppressants to achieve weight loss. Both of these compounds have significant side-effect profiles that include worsening hypertension and severe vasoconstriction that may result in intestinal angina or coronary ischemia. Grape seed extract contains antioxidants, which can help prevent damage caused by highly reactive free radicals that damage cell function and promote

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