

Dietary Antioxidants as a Promising Nutritional Strategy for Obesity Management: Current Evidence and Future Perspectives

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Abstract

Obesity is a multifactorial metabolic disorder characterized by excessive adipose tissue accumulation and is strongly associated with insulin resistance, chronic inflammation, cardiovascular diseases, and type 2 diabetes mellitus. Increasing evidence suggests that oxidative stress plays a central role in the development and progression of obesity by disrupting adipocyte function, promoting inflammatory pathways, and impairing glucose and lipid metabolism. Consequently, nutritional strategies targeting oxidative stress have attracted considerable scientific interest. Dietary antioxidants, naturally abundant in fruits, vegetables, whole grains, nuts, and other plant-derived foods, may contribute to metabolic health through multiple biological mechanisms. Vitamins C and E, carotenoids, selenium, zinc, and diverse polyphenolic compounds have been reported to reduce reactive oxygen species, strengthen endogenous antioxidant defenses, attenuate inflammatory signaling, improve insulin sensitivity, regulate adipokine secretion, and modulate lipid metabolism. In addition, several phytochemicals have demonstrated favorable effects on energy expenditure, thermogenesis, appetite regulation, and adipogenesis, suggesting their potential role in body weight management. Although experimental and clinical findings indicate that antioxidant-rich dietary patterns may improve obesity-related metabolic abnormalities, current evidence remains heterogeneous due to differences in study design, antioxidant sources, intervention duration, and participant characteristics. Therefore, routine antioxidant supplementation cannot yet be universally recommended. Instead, maintaining a balanced diet naturally rich in antioxidant-containing foods appears to represent the most evidence-based nutritional approach. In conclusion, dietary antioxidants constitute a promising adjunctive strategy for obesity prevention and management by targeting oxidative stress and chronic inflammation. Future well-designed, long-term randomized clinical trials are required to clarify optimal dietary recommendations, effective antioxidant combinations, and personalized nutritional interventions for obesity treatment.

Index Terms

Obesity, Dietary antioxidants, Oxidative stress, Polyphenols, Inflammation, Insulin resistance, Nutritional therapy