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β-Cryptoxanthin ameliorates metabolic risk factors by regulating NF-κB and Nrf2 pathways in insulin resistance induced by high-fat diet in rodents.

Sahin K[1], Orhan C[2], Akdemir F[3], Tuzcu M[4], Sahin N[2], Yılmaz I[5], Juturu V[6].

Author information

1 Firat University, Department of Animal Nutrition, Elazig, Turkey. Electronic address: nsahinkm@yahoo.com.
2 Firat University, Department of Animal Nutrition, Elazig, Turkey.
3 Department of Nutrition, Faculty of Fisheries, Inonu University, Malatya, Turkey.
4 Firat University, Department of Biology, Elazig, Turkey.
5 Department of Pharmacology, Faculty of Pharmacy, Inonu University, Malatya, Turkey.
6 OmniActive Health Technologies Inc., Department of Clinical Affairs, Morristown, USA.

Abstract

The aim of this experiment was to determine the effects of β-cryptoxanthin (BCX) on the cardiometabolic health risk factors and NF-κB and Nrf2 pathway in insulin resistance induced by high-fat diet (HFD) in rodents. Twenty-eight Sprague-Dawley rats were allocated into four groups: (1) Control, rats fed a standard diet for 12 weeks; (2) BCX, rats fed a standard diet and supplemented with BCX (2.5 mg/kg BW) for 12 weeks; (3) HFD, rats fed a HFD for 12 weeks, (4) HFD + BCX, rats fed a HFD and supplemented with BCX for 12 weeks. BCX reduced cardio-metabolic health markers and decreased inflammatory markers ($P < 0.001$). Rats fed a HFD had the lower total antioxidant capacity and antioxidant enzymes activities and higher MDA concentration than control rats ($P < 0.001$ for all). Comparing with the HFD group, BCX in combination with HFD inhibited liver NF-κB and TNF-α expression by 22% and 14% and enhanced liver Nrf2, HO-1, PPAR-α, and p-IRS-1 by 1.43, 1.41, 3.53, and 1.33 fold, respectively ($P < 0.001$). Furthermore, in adipose tissue, BCX up-regulated Nrf2, HO-1, PPAR-α, and p-IRS-1 expression, whereas, down-regulated NF-κB and TNF-α expression. In conclusion, BCX decreased visceral fat and cardiometabolic health risk factors through modulating expressions of nuclear transcription factors.

KEYWORDS: Antioxidant properties; High-fat diet; Inflammation; β-cryptoxanthin

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