عنوان مقاله:

High-intensity interval training reduced oxidative stress and apoptosis in the hippocampus of male rats with type ۲ diabetes: The role of the PGC۱α-Keap۱-Nrf۲ signaling pathway

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خلاصه مقاله:

Objective(s): This study aimed to determine the effect of ۸-week high-intensity interval training (HIIT) on oxidative stress and apoptosis in the hippocampus of male rats with type ۲ diabetes (T۲D). The study focused on examining the role of proliferator-activated receptor gamma co-activator ۱α (PGC۱α)/Kelch-like ECH-associated protein Keap۱/nuclear factor erythroid ۲-related factor ۲ (Nrf۲) signaling pathway.Materials and Methods: Twenty-eight ۸-week-old Wistar rats were randomly assigned to one of four groups (n=۷): control (Con), type ۲ diabetes (T۲D), exercise (Ex), and exercise + type ۲ diabetes (Ex+T۲D). The Ex and Ex+T۲D groups completed an ۸-week exercise program consisting of ۸۰-۱۰۰% Vmax and ۴–۱۰ intervals. The homeostasis model assessment of insulin resistance (HOMA-IR) index was used to assess insulin resistance. The levels of Bcl۲, BAX, musculoaponeurotic fibrosarcoma (Maf), Nrf۲, Keap۱, and PGC۱α in the hippocampus were assessed using the western blot method. Additionally, the levels of antioxidant enzymes in the hippocampus were measured using ELISA.Results: The findings indicated that the T۲D group had lower levels of antioxidant enzymes, Maf, Bcl۲, PGC۱α, and Nrf۲, and higher levels of BAX and Keap۱ in the hippocampus. Conversely, the HIIT group exhibited increased levels of antioxidant enzymes, Maf, Bcl۲, Nrf۲, and PGC۱α, along with decreased levels of BAX and Keap۱ in the hippocampus.Conclusion: The study demonstrated that ۸-week HIIT was effective in reducing hippocampal apoptosis and oxidative stress induced by T۲D by activating the PGC۱α-Keap۱-Nrf۲ signaling pathway. The metabolic changes induced by exercise may lead to an increase in PGC۱ expression, which is the primary stimulator of the Keap۱-Nrf۲ signaling pathway.

کلمات کلیدی:

Anti-oxidant enzymes, Apoptosis, Hippocampus, PGC۱α, Type ۲ diabetes

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