



Effect of Eight-Week High-Intensity Interval Training (HIIT) Combined with Probiotic Mixture Consumption on Catalase and Malondialdehyde Levels in Heart Tissue of Diabetic Rats

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Citation:

Alizadeh A, Shirvani H, Mahmoodzadeh Hosseini H. Effect of Eight-Week High-Intensity Interval Training (HIIT) Combined with Probiotic Mixture Consumption on Catalase and Malondialdehyde Levels in Heart Tissue of Diabetic Rats. *Iranian biomedical journal* 2024; 28(7): 246.

ABSTRACT

Introduction: Type 2 diabetes (T2D) is associated with a decrease in antioxidant defense in heart tissue, which leads to increased oxidative stress and cardiovascular complications. This study aimed to determine the effect of eight weeks of high-intensity interval training (HIIT) and mixed probiotic consumption on the amount of catalase (CAT) and malondialdehyde (MDA) in the heart tissue of T2D male rats.

Methods and Materials: For this purpose, 25 male Wistar rats (eight weeks old) with an average weight of 200-220 g were divided into five groups, including (1) healthy control, (2) diabetic control, (3) diabetes + HIIT, (4) diabetes + probiotic mixture, and (5) diabetes + HIIT + probiotic mixture. The exercise training protocol was designed five days a week for eight weeks for training groups. T2D was also induced by injecting nicotinamide and streptozotocin (STZ), and rats with blood sugar higher than 200 mg/dL were included in the study as diabetic rats. Also, the probiotic groups received bacterial suspension containing 10¹⁰ CFU/ml of three bacteria (*Lactobacillus rhamnosus* GG, *Lactococcus casei*, and *Lactobacillus roteri*) by gavage daily for eight weeks and five days a week. Forty-eight hours after the last intervention, the rats were anesthetized with a combination of xylazine and ketamine, and the heart tissue was collected. ELISA tissue kit was used to measure malondialdehyde (MDA) and CAT. Data analysis was performed using Shapiro-Wilk statistical tests, one-way analysis of variance, and Scheffe's post hoc test.

Results: The results showed that eight weeks of HIIT, along with the consumption of mixed probiotics, significantly increased the CAT level and reduced the MDA level in the heart tissue of STZ-treated diabetic rats ($p = 0.05$).

Conclusion and Discussion: The findings of the current study demonstrate that combining the two above-mentioned interventions increases the antioxidant defense of cardiomyocytes in T2D, which can be investigated more closely as a therapeutic strategy in diabetic patients.

Keywords: High-intensity interval training, Oxidative stress, Probiotics