

The Effect of High Intensity Interval Training on STAT-3 and Angiopoietin-1 Gene Expression, and tie-2 Protein in Mice with Breast Cancer

Ahmadian M: Physical Education Department, Sanandaj Branch, Islamic Azad University, Sanandaj, Iran

Azizbeigi K: Physical Education Department, Sanandaj Branch, Islamic Azad University, Sanandaj, Iran

Delfan M: Department of Exercise Physiology, Faculty of Physical Education and Sport Sciences, Alzahra University, Tehran, Iran

Atashak S: Physical Education Department, Mahabad Branch, Islamic Azad University, Mahabad, Iran

Corresponding Author: Kamal Azizbeigi, kazizbeigi@gmail.com

Abstract

Introduction: Angiogenesis has a great role in physiological development of tissues and tumors. Considering the key role of STAT-3 and angiopoietin-1-tie-2 in angiogenesis, this study aimed to investigate the effect of 10 weeks of high intensity interval exercise (HIIT) on STAT-3 and angiopoietin-1 gene expression, and tie-2 protein in mice with breast cancer.

Methods: After inducing cancer (subcutaneous injection of MC4-L2 on the right side of mice), twelve Balb/c mice (6-8 weeks, weight 19 ± 1.05) were randomly assigned to HIIT ($n=6$) and non-active groups ($n=6$). HIIT sessions were performed five days a week for 10 weeks. Twenty-four hours after the last session of HIIT, the animals were sacrificed and the tumor tissue was isolated for measuring the expression of STAT-3 and angiopoietin-1 gene by qreal time PCR and measuring tie-2 protein by western blot method. Tumor volume changes were also assessed using a digital caliper every week.

Results: The results of this study showed a significant decrease in expression of STAT-3 and angiopoietin-1, and changes in tumor volume and tie-2 in the training group compared to the control group ($p =0.001$).

Conclusion: It appears that high intensity interval exercise can reduce the rate of tumor progression through decreasing the expression of some angiogenesis promoters, and is an effective non-medical method for reducing tumor growth.

Keywords: Breast Cancer, High Intensity Interval Training, Angiogenesis, STAT-3, Angiopoietin-1 and tie-2