ORIGINAL ARTICLE

Iranian Quarterly Journal of Breast Disease 2018; 11(3):32.

The Effect of Endurance Training on Tumor Tissue Levels of Caspase-3 and Caspase-9 in Mice with Breast Cancer

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[DOR: 20.1001.1.17359406.1397.11.3.4.4]

[DOI: 10.30699/acadpub.ijbd..11.3.32]

Abstract

Introduction: Today, cancer is the second leading cause of death, and breast cancer is the most common cancer, among women. The levels of apoptotic factors, such as caspases, decrease in tumor, leading to tumor growth. The present study investigated the effect of aerobic exercise on the regulation of caspase-3 and -9 in breast cancer.

Methods: After familiarization, 20 BALB/c mice received transplants of estrogen receptor–positive MC4-L2 tumor cell line to develop cancer. The animals were then randomized into two groups: control (n = 10) and exercise (n = 10). The exercise group performed incremental endurance training (at 18-22 m/s, equivalent to 55% to 70% of aerobic capacity in mice) for 6 weeks, 5 days per week, while the control group did not exercise. Tumor volume was measured in on a weekly basis with a digital caliper. At the end of the study, mice were sacrificed, and tumor tissues were removed and frozen in liquid nitrogen and stored at -70°C. Tissue levels of caspase-3 and caspase-9 were measured using ELISA kits (catalogue number: SEA626Mu and E03C0551, respectively).

Results: The expression of caspase-3 (p = 0.001) and caspase-9 (p = 0.013), and the ratio of heart weight to body weight (p = 0.001) were significantly greater in the exercise group than in controls. On the other hand, the exercise group had a significantly lower rate of tumor growth (p = 0.001) and tumor weight (p = 0.001) compared with the controls.

Conclusion: Aerobic exercise can increase the expression of caspase-3 and caspase-9 and reduce tumor growth rate and tumor weight in breast cancer. Therefore, it can be claimed that exercise training can reduce tumor volume, and thus improve the condition of the mice with cancer, by increasing the levels of apoptotic factors.

Keywords: Breast Cancer, Endurance Training, Caspase-3, Caspase-9

This study was approved by the Animal Ethics Committee of Sport Sciences Research Institute in 2016. The registration number was IR.SSRI.REC.1395.129.