

High Intensity Exercise Induces Immune Suppression Through Endocannabinoid Increase

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Background and aim of the study:

Neuroendocrine mediators either induce or inhibit the immune system. However, the cellular and molecular mechanism is not known [1]. The aim of this study was to experimentally identify the effect of exercise intensity on the endocannabinoids, Anandamid (ANA) and 2-Arachidonylglycerol (2-AG), and the immune system.

Materials and Method:

32 male Sprague Dawley rats were assigned randomly into 3 groups ; (a) Endurance type of exercise (b) Moderate type of exercise and (c) Control groups. Rats were exercised on a treadmill for 5 days per week at moderate (18 m/min) and high (35 m/min) intensity for 16 weeks. Blood samples were collected immediately after the last bout of exercise. ANA and 2-AG serum levels were determined with Affinity Chromatography and HPLC; whereas alterations in immune cells were determined quantitatively by flowcytometry and immunohistochemistry [2].

Results:

Results of Mann-Whitney U tests indicated significantly higher ANA and 2-AG plasma levels in the Endurance type of exercise group compared to the moderate type of exercise group and control group (Figure -1). However, same test results indicated that there was not a significant difference between the moderate type of exercise group and control group in terms of ANA or 2-AG levels. WBC counts and lymphocyte percentage were significantly lower in the endurance type of exercise group when compared to that of moderate type of exercise and control groups. On the other hand neutrophil percentage was significantly higher in the endurance type of exercise group (Figure-2). However, there was not a significant difference between the moderate type of exercise group and control group in terms of WBC counts, Lymphocytes or neutrophils. NK cells, B cells and T cells were lower in the endurance type of exercise group comparing to other groups (Figure-3). Immunohistological distribution of T and B cells in spleen and thymus were in accordance with the blood flow cytometric results.

Discussion and Conclusion:

The findings of this study provide the first evidence that endurance type of exercise stimulates the endocannabinoid system activity which in turn suppresses the immune system. Exercise significantly elevated ANA and to some extent 2-AG plasma levels. We conclude that endocannabinoids, ANA and 2-AG, are produced in the peripheral system as a response to endurance type of exercise and act on immune effector cells [3].

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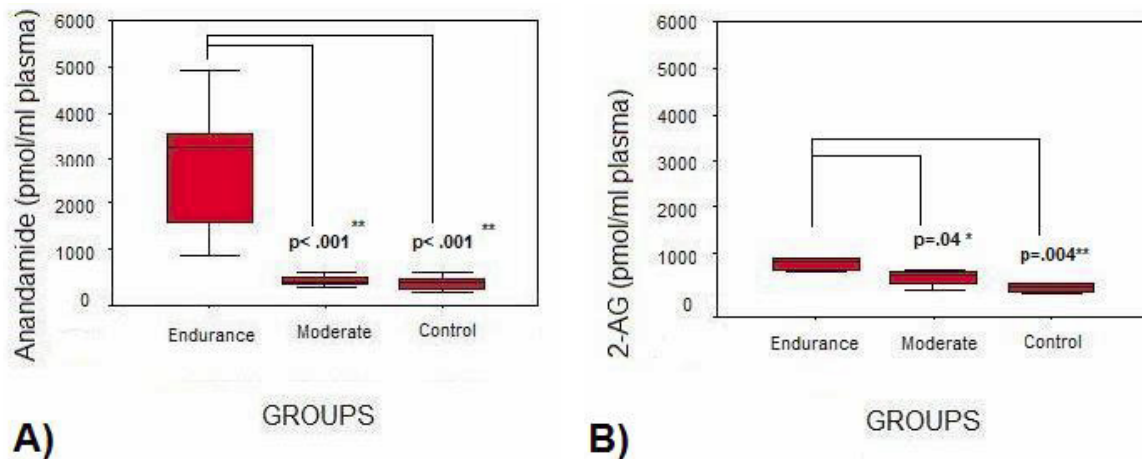


Figure 1. Differences of (A) Anandamide and (B) 2-Arachidonylglycerol concentrations in 1 ml plasma between endurance type of exercise, moderate type of exercise and control groups.

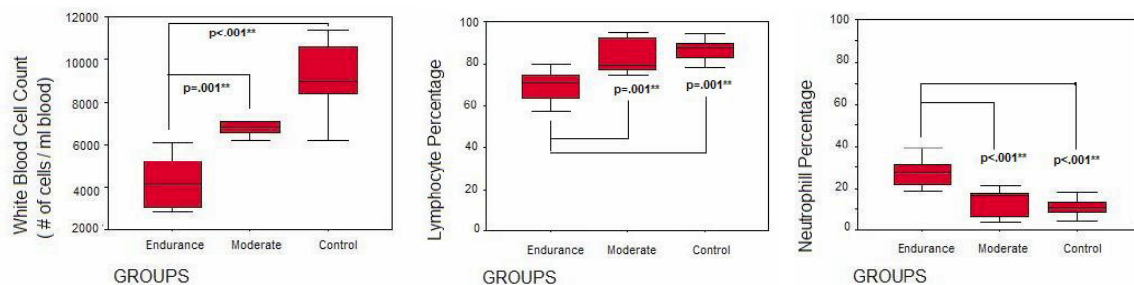


Figure 2. Differences of WBC count, Lymphocyte percentage and neutrophil percentages between the endurance type of exercise, moderate type of exercise and control groups

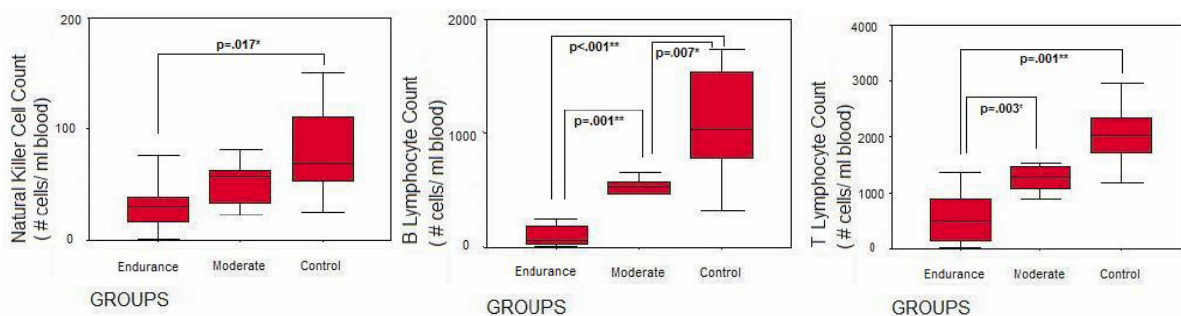


Figure 3. The differences of Immune effector cell counts in endurance exercise, moderate exercise and control group