

## Effects of Extra Virgin Olive Oil Phytochemicals Supplementation and Aerobic Exercise Training on Inflammatory and Hormonal Markers in Rats Fed Atherogenic Diet

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### ABSTRACT

Westernized diet and sedentary lifestyle may exacerbate systemic inflammation and provoke hormonal changes. Extra virgin olive oil (EVOO) derived phytochemicals Oleocanthal (Oleo) and Oleacein (Olea) demonstrate anti-inflammatory and antioxidant effects. **PURPOSE:** The purpose of the study is to evaluate the effects of Oleo/Olea supplementation and aerobic exercise training (AET) on plasma inflammatory cytokines and hormones in rats fed high fat atherogenic diet. **METHODS:** Forty-eight female Sprague-Dawley rats were fed an atherogenic diet consisting of 1.25% cholesterol and 0.5% cholic acid for 12 weeks. Half of the rats were supplemented with 20% EVOO containing high Oleo/Olea (1000 mg/kg, HO, n=24) or low Oleo/Olea (100 mg/kg, LO, n=24). In each dietary group, half group was trained (T) on treadmill for 12 weeks (25m/min, 10% grade for 60 min/day, 5 days/week), while the other half remained sedentary. Two separate groups of rats were fed a chow diet (C, n=6) and atherogenic diet (A, n=12), respectively without EVOO or T. Inflammatory cytokines (interleukin (IL)-1 $\beta$ , monocyte chemoattractant protein (MCP)-1 and tumor necrosis factor (TNF)- $\alpha$ ) and hormones (leptin and insulin) were measured in plasma using Bioplex 200 Multiplex immunoassay. **RESULTS:** IL-1 $\beta$  and TNF- $\alpha$  were increased in A vs. C ( $P<0.01$ ). LO increased IL-1 $\beta$  compared to A ( $P<0.05$ ) but not HO. HO showed a trend to lower IL-1 $\beta$  vs. LO ( $P=0.064$ ). Although MCP-1 and TNF- $\alpha$  were both decreased in EVOO vs. A ( $P>0.05$ ), significant differences were only found in EVOO+T compared to A ( $P<0.05$ ). In addition, EVOO+T showed significant reduction on TNF- $\alpha$  compared to EVOO ( $P<0.05$ ). Leptin and insulin were lowered in EVOO and further reduced in EVOO+T vs. A ( $P<0.05$ ). Insulin was also decreased in LO vs. A ( $P<0.05$ ), but elevated in HO vs. LO ( $P<0.05$ ). **CONCLUSION:** High-fat atherogenic diet induced plasma inflammatory cytokines but were ameliorated by EVOO supplementation and AET. Hormones leptin and insulin were decreased by EVOO supplementation and AET.