

Current issue**Archival Issues**

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Effects of oxidative stress caused by acute and regular exercise on levels of some serum metabolites and the activities of paraoxonase and arylesterase

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[Biol Sport](#) 2005; 22 (4):

ICID: 891460

Article type: Original article

IC™ Value: 10.26

Abstract provided by Publisher



Regular exercise practice has a protective role on coronary heart disease and empowers antioxidant defense system, whereas acute exercise induces oxidative stress. The aims of this study were to investigate the effects of oxidative stress on the levels of serum paraoxonase (PON1) and arylesterase activities, HDL-cholesterol (HDL), malondialdehyde (MDA) and various lipid parameters in regular exercised individuals and to compare them with those of acute exercised and sedentary persons. The study was carried out on three groups called regular exercise group (REG), acute exercise group (AEG) and sedentary group (SG) that consisted of respectively 23 healthy individuals having 6.0 ± 2.50 year sport age and regular physical and conditional sport activities 3 hours a day for last 6 months, 24 healthy subjects performing acute exercise 3 days a week for 3 months and 26 healthy men with no sport activity. The levels of PON1 and arylesterase activities and MDA in REG were 221.96 ± 35.66 U•L⁻¹, 103.85 ± 28.93 U•ml⁻¹ and 1.836 ± 0.31 nmol•ml⁻¹, respectively. The levels of serum creatine kinase (CK) (125.29 ± 81.86 U•ml⁻¹), MDA (1.215 ± 0.32 nmol•ml⁻¹) and PON1 activity (184.68 ± 33.37 U•L⁻¹) displayed statistically significant differences in AEG compared with REG ($p < 0.001$). Serum arylesterase activity levels exhibit no significant difference in three groups ($p > 0.05$). HDL levels in AEG and REG significantly increased ($p < 0.001$) as compared to SG. Our results demonstrated that regular exercise caused an increase in PON1 activity, which shows that oxidative stress has a significant influence on this enzyme activity.

ICID 891460

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