

Andersson H, Karlsen A, Blomhoff R, Raastad T, Kadi F. Plasma antioxidant responses and oxidative stress following a soccer game in elite female players. Scand J Med Sci Sports. 2010 Aug;20(4):600-8. Epub 2009 Aug 23.

Abstract

We aimed to investigate markers of oxidative stress and levels of endogenous and dietary antioxidants in 16 elite female soccer players in response to a 90-min game (average intensity $82 \pm 3\%$ HRpeak). Blood samples were taken before, immediately and 21 h after the game. Plasma-oxidized glutathione, the ratio of reduced to oxidized glutathione (GSH:GSSG) and lipid peroxidation measured by d-ROMs were used as markers of oxidative stress. Plasma endogenous [uric acid, total glutathione (TGSH)] and dietary antioxidants (alpha-tocopherol, ascorbic acid, total carotenoids and polyphenols) were analyzed using liquid chromatography and the Folin-Ciocalteu method. Exercise induced an acute increase ($P < 0.05$) in GSSG, uric acid, TGSH, alpha-tocopherol, and ascorbic acid. In parallel, the GSH:GSSG ratio and polyphenols decreased ($P < 0.05$). GSSG, GSH:GSSG ratio, uric acid, TGSH, and ascorbic acid returned to baseline at 21 h, while polyphenols and alpha-tocopherol remained altered. Total carotenoids increased above baseline only at 21 h ($P < 0.05$). Lipid peroxidation, measured by d-ROMs, remained unchanged throughout the study. Thus, intermittent exercise in well-trained female athletes induces a transient increase in GSSG and a decrease in the GSH:GSSG ratio, which is effectively balanced by the recruitment of both endogenous and dietary antioxidants, resulting in the absence of lipid peroxidation measured by d-ROMs.