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Effect of Treadmill Exercise and Hydrogen-rich Water Intake on Serum Oxidative and Anti-oxidative Metabolites in Serum of Thoroughbred Horses

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Abstract

The present study aimed to clarify changes of oxidative stress and antioxidative functions in treadmill-exercised Thoroughbred horses (n=5, 3 to 7 years old), using recently developed techniques for measurement of serum d-ROMs for oxidative stress, and BAP for antioxidative markers. Also, the effect of nasogastric administration of hydrogen-rich water (HW) or placebo water preceding the treadmill exercise on these parameters was examined. Each horse was subjected to a maximum level of treadmill exercise in which the horses were exhausted at an average speed of 13.2 ± 0.84 m/sec. Blood samples were taken 4 times, immediately before the intake of HW or placebo water at 30 min preceding the treadmill exercise, immediately before the exercise (pre-exercise), immediately after the exercise (post-exercise) and at 30 min following the exercise. In all horses, both d-ROMs and BAP values significantly increased at post-exercise. The increase in d-ROMs tended to be lower in the HW trial, as compared to the placebo trial at pre-exercise. The increase in BAP was considerable at approximately 150% of the pre-exercise values in both the HW and placebo treatment trials. The BAP/d-ROMs ratio was significantly elevated at post-exercise in both treatment trials, while a significant elevation was also observed at pre-exercise in the HW trial. BAP, d-ROM, and the BAP/d-ROM ratio tended to decline at 30 min after the exercise, except BAP and BAP/d-ROMs in the placebo trial. These results demonstrate that the marked elevation of oxidative stress and antioxidative functions occurred simultaneously in the intensively exercised horses, and suggest a possibility that HW has some antioxidative efficacy.

Keywords: BAP; Thoroughbred; d-ROMs; exercise; hydrogen-water.

Figures

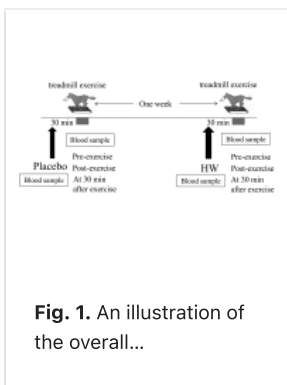


Fig. 1. An illustration of the overall...

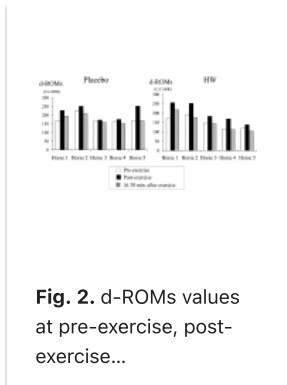


Fig. 2. d-ROMs values at pre-exercise, post-exercise...

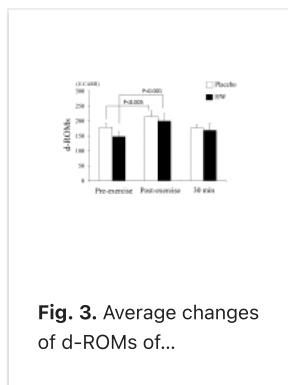


Fig. 3. Average changes of d-ROMs of...

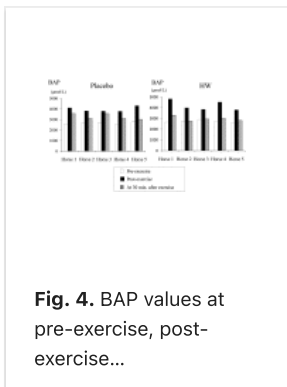


Fig. 4. BAP values at pre-exercise, post-exercise...

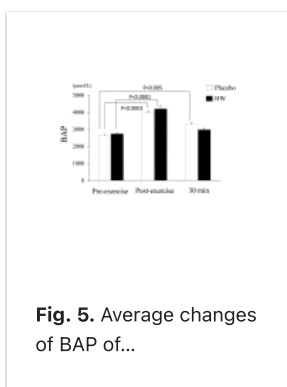


Fig. 5. Average changes of BAP of...

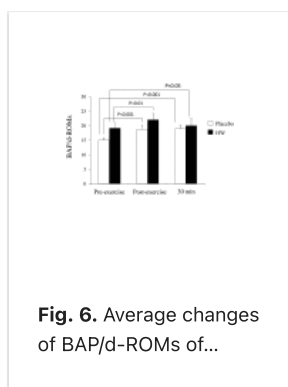


Fig. 6. Average changes of BAP/d-ROMs of...

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