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The effect of low-level laser therapy on oxidative stress and functional fitness in aged rats subjected to swimming: an aerobic exercise

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Abstract

The aim of the present study was to determine whether low-level laser therapy (LLLT) in conjunction with aerobic training interferes with oxidative stress, thereby influencing the performance of old rats participating in swimming. Thirty Wistar rats (*Norvegicus albinus*) (24 aged and six young) were tested. The older animals were randomly divided into aged-control, aged-exercise, aged-LLLT, aged-LLLT/exercise, and young-control. Aerobic capacity ($VO_{2max}(0.75)$) was analyzed before and after the training period. The exercise groups were trained for 6 weeks, and the LLLT was applied at 808 nm and 4 J energy. The rats were euthanized, and muscle tissue was collected to analyze the index of lipid peroxidation thiobarbituric acid reactive substances (TBARS), glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT) activities. $VO_{2(0.75)max}$ values in the aged-LLLT/exercise group were significantly higher from those in the baseline older group ($p < 0.01$) and the LLLT and exercise group ($p < 0.05$). The results indicate that the activities of CAT, SOD, and GPx were higher and statistically significant ($p < 0.05$) in the LLLT/exercise group than those in the LLLT and exercise groups. Young animals presented lesser and statistically significant activities of antioxidant enzymes compared to the aged group. The LLLT/exercise group and the LLLT and exercise group could also mitigate the concentration of TBARS ($p > 0.05$). Laser therapy in conjunction with aerobic training may reduce oxidative stress, as well as increase $VO_{2(0.75)max}$, indicating that an aerobic exercise such as swimming increases speed and improves performance in aged animals treated with LLLT.

Keywords: Aerobic exercise; Aged; Low-level laser; Oxidative stress.