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Hydrogen-rich saline prevents bone loss in diabetic rats induced by streptozotocin

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Abstract

Purpose: As an antioxidant molecule, hydrogen has been received much more attention and reported to be used as the treatment strategy for various diseases. In this study, we hypothesize that systemic delivery of hydrogen saline water may improve the reservation of bone tissue in the tibias and femurs of osteoporotic rats caused by diabetes mellitus (DM), which is characterized by increased levels of oxidative stress and overproducing reactive oxygen species (ROS).

Methods: The animals were divided into three groups of 12 animals and lavaged with normal saline (normal control and DM), or hydrogen saline water (DM + HRS). General status, blood glucose level, tibial and femoral mechanical strength, and micro-CT scans of the proximal tibia were recorded and analyzed.

Results: After 12 weeks, the glucose level was significantly decreased in the DM + HRS group compared with that of the DM group. Micro-CT scans showed that bone volume/total volume, connectivity density, trabecular thickness, and trabecular number were significantly increased compared with the DM group. Mechanical results of energy, stiffness and elastic modulus in the DM + HRS group were significantly higher than in the other groups for the tibia and femur.

Conclusions: The results indicate that the systemic delivery of hydrogen saline water, which is safe and well tolerated, preserves bone volume and decreases fracture risks in streptozotocin-induced diabetic status rats, whose bone structure or inherent material properties of bone tissues are changed.

Keywords: Diabetes; Hydrogen; Osteoporosis.

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