Green Tea Extract Promotes Bone Formation by Mitigating Oxidative Stress and Iron Overload in bone cells

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Abstract:

Osteoporosis is a common complication in β-thalassemia patients with iron overload according to iron-induced oxidative damage and severe bone loss. The iron elimination and oxidative stress relief are the important strategies for slowing down osteoporosis progression. Many natural products promote the iron chelation and antioxidant capacity. Green tea extract (GTE) from Camellia sinensis leaves, is rich in epigallocatechin-3-gallate (EGCG), an active ingredient which is known for its powerful antioxidant and iron chelation properties. This research aims to demonstrate the effect of GTE on improvement of osteoporosis through decreasing of oxidative stress and inducing of bone formation in osteosarcoma (MG63) cell line. Monotherapy of GTE and combination therapy with commercial iron chelator, deferiprone (DFP), can significantly reduce the iron content, intracellular reactive oxygen species (ROS), and lipid peroxidation product (Malondialdehyde; MDA) in iron overloaded bone cells. Additionally, GTE has been found to increase bone formation markers; osteoprotegerin (OPG) and osteocalcin (BGLAP). This suggests that both GTE alone and combination with DFP could be a valuable approach in managing oxidative stress, decreasing iron, and promoting bone health in iron overload condition which infers the delayed osteoporosis in iron overloaded β-thalassemia patients.