

Calcium Metabolism and Oxidative Stress in Bone Fractures: Role of Antioxidants

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Abstract:

Calcium ion is an essential structural component of the skeleton. There is growing evidence for the importance of nutrition in the maintenance of bones and joints health. Nutritional imbalance combined with endocrine abnormalities may be involved in osteoporosis. For example, essential fatty acids and their metabolites were reported to have beneficial action in osteoporosis. The mechanism by which fatty acids prevent osteoporosis may involve inhibition of pro-inflammatory cytokines, which are known to have a major role in osteoporosis through induction of oxidative stress which had adverse effects on the skeleton. Other risk factors for osteoporosis, such as smoking, hypertension and diabetes mellitus are also associated with increased oxidative stress and free radicals levels.

When bone fracture occurs, a remarkable yield of free radicals is generated by the damaged tissues. However, controlled production of free radicals by normally functioning osteoclasts could accelerate destruction of calcified tissues and assist bone remodeling. Enhanced osteoclastic activity observed in bone disorders may have been responsible for increased production of reactive oxygen species [ROS] in the form of superoxide, which is evident by increased levels of serum malondialdehyde [MDA] levels. One of the most damaging effects of ROS is lipid peroxidation, the end product of which is MDA which also served as a measure of osteoclastic activity. Inhibition of the antioxidant enzymes activities, such as superoxide dismutase and glutathione peroxidase, was found to increase superoxide production by the osteoclasts which represented by increased levels of MDA. Therefore, oxidative stress is an important mediator of bone loss since deficiency of antioxidant vitamins has been found to be more common in the elderly osteoporotic patients. It is concluded from this review that increased free radical production overwhelms the natural antioxidants defense mechanisms, subjecting individuals to hyperoxidant stress and thus leading to osteoporosis. In addition, administration of antioxidants might protect bones from osteoporosis and also might help in the acceleration of healing of fractured bones.

Keywords: [parathyroid hormone](#); [Estrogen](#); [L-NG-monomethyl arginine](#); [Calcitonin](#); [Bone Fractures](#)

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