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Effects of Boric acid on Alveolar bone loss and PDL

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Alveolar bone loss is very common phenomenon in periodontal disease. Some studies have suggested that boric acid decreases aggressive alveolar bone loss in periodontitis. Boric acid (H_3BO_3) is a weak, monobasic Lewis acid of boron. It may be prepared by reacting borax with a mineral acid, such as hydrochloric acid :

$Na_2B_4O_7 \cdot 10H_2O + 2\ HCl \rightarrow 4\ B(OH)_3$ [or H_3BO_3] $+ 2\ NaCl + 5\ H_2O$

Boric acid is soluble in boiling water. It was first registered in the US as an insecticide in 1948. Boric acid is also known as a neutron poison in nuclear power plants. In agriculture it is used to treat boron deficiencies in plants.

Boric acid become Toxic for human in some phenomenon. Its lethal dose is 2,660 mg/kg body mass for mammalian. Long term exposure to boric acid causes kidney damage. It has some medical uses in burns, cuts, eye wash, acne treatment, candidiasis and ear infection. Recently some research works have done on boric acid in dentistry.

Alejandro et al. (2008) histomorphometrically examined the alveolar bone modelling and remodelling in mice been fed a boron-deficient diet. Boron deficient diet rat shows a significant reduction in osteoblast surfaces and increase in quiescent surfaces when compared with boron rich diet rat. Boron doesn't affect the eroded surfaces of bone. Boron deprivation does not markedly affect the calcium and phosphorus concentrations in bone.

In 2011 Xiaozhou et al. demonstrated the acceleration of osteogenic activity of boron in vitro. Boron increased the ALP activity of human bone marrow cells. The calcium depositions, expression of osteocalcin, collagen type I and bone morphogenic protein 7 were also significantly increased by boric acid. But the application shows no difference in osteoblast proliferation.

Boric acid inhibits periodontitis as well as alveolar bone loss by decreasing osteoclastic differentiation.

Inflammatory cell infiltration and alveolar bone loss are significantly high in diabetic periodontitis rats. Balci et al. (2014) demonstrated that, boric acid inhibits the alveolar bone loss in diabetic periodontitis in rats with increased number of osteoblasts in bone.

Hulya et al. (2016) also reported the inhibitory effect of boric acid on alveolar bone loss in osteoporosis and periodontitis in rat.

So boric acid increases the osteoblastic activity and decreases the osteoclastic activity. Now we are also working on the effects of boric acid in periodontitis, focusing on how it increases the osteoblast and how it acts on osteoclastogenesis as well as how it works in periodontal ligament remodelling. However, there is not yet all the requirements are evaluated to consider the boric acid as a clinical beneficial agent and research on this topic should be carried on.

Reference

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