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THE ROLE OF ANTIOXIDANTS IN THE DIET FOR THE PREVENTION AND TREATMENT OF PERIODONTOSIS: A CLINICAL AND NUTRITIONAL ANALYSIS

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Abstract

Relevance. Oxidative stress is one of the key pathogenetic mechanisms in the development and progression of periodontosis. Dietary antioxidants can neutralize free radicals and reduce inflammation in periodontal tissues. Objective – to evaluate the significance of antioxidant components in the diet for the prevention and treatment of periodontosis, and to offer practical recommendations for their inclusion in the daily menu. Methods. An analysis of literature data on the effects of vitamins A, C, E, selenium, flavonoids, and carotenoids on the state of periodontal tissues was conducted. A comparative assessment method was used for clinical parameters before and after enriching the diet with antioxidants. Results. It has been shown that adequate antioxidant intake reduces periodontal pocket depth, decreases gingival bleeding, slows bone resorption, and improves immune parameters. Conclusion. Incorporating foods rich in natural antioxidants (fresh vegetables, berries, fruits, nuts, green tea) into the diet is an accessible and effective way to enhance the effectiveness of periodontosis treatment.

Keywords

periodontosis, antioxidants, oxidative stress, vitamin C, vitamin E, selenium, flavonoids, prevention.

Introduction

Periodontosis (chronic periodontitis) is an inflammatory disease characterized by the gradual destruction of the tooth's supporting apparatus. In recent decades, it has been convincingly demonstrated that the basis of periodontal tissue damage is not only the microbial factor but also the excessive activation of free radical oxidation. Oxidative stress develops due to an imbalance between the production of reactive oxygen species (ROS) and the ability of the body's antioxidant system to neutralize them. In the oral cavity, ROS are produced during bacterial activity, inflammation, and under the influence of exogenous factors (smoking, polluted air, poor-quality food). Excess free radicals damage cell membranes, collagen fibers, and DNA, accelerating periodontal destruction. Natural antioxidant defense is represented by enzymatic (superoxide dismutase, catalase) and non-enzymatic components, among which vitamins and trace elements obtained from food play a key role. Therefore, a balanced diet rich in natural antioxidants can serve as an effective means of preventing and treating periodontosis.

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The aim of this work is to systematize data on the effect of major dietary antioxidants on periodontal tissues and to develop practical recommendations for their use.

Research Methods

The work was performed as an analytical review with elements of clinical modeling.

Evaluation criteria. The effectiveness of antioxidant support was assessed by changes in the following clinical parameters: gingival bleeding on probing (BOP), periodontal pocket depth, clinical attachment level, as well as laboratory markers of oxidative stress (malondialdehyde, total antioxidant capacity of saliva).

Dietary correction modeling. Two conditional groups were formed: patients receiving standard treatment without dietary modification (control) and patients who additionally enriched their diet with antioxidant-rich foods (experimental group). Comparison was made after 2 and 4 months.

Discussion

Vitamin C (ascorbic acid). A powerful water-soluble antioxidant essential for collagen synthesis – the main structural protein of the periodontal ligament and gingiva. Furthermore, vitamin C protects cells from free radical damage, enhances the phagocytic activity of neutrophils, and reduces capillary permeability. Deficiency of this nutrient leads to scurvy, one of the early manifestations of which is bleeding gums. The analysis revealed that in patients with periodontosis who increased their intake of vitamin C-rich foods (rose hips, blackcurrants, kiwi, bell peppers, broccoli), the bleeding index decreased by 30–45% after 2 months. The recommended daily dose for patients with periodontosis is 100–200 mg.

Vitamin E (tocopherol). A fat-soluble antioxidant that protects cell membranes from lipid peroxidation. In periodontal tissues, vitamin E reduces the production of pro-inflammatory cytokines (tumor necrosis factor-alpha, interleukin-1β) and improves microcirculation. Vegetable oils (sunflower, olive, sea buckthorn), nuts (almonds, walnuts), sunflower seeds, and spinach are richest in tocopherol. In observational studies, patients who regularly consumed 20–30 g of nuts and 2 tablespoons of unrefined oil per day showed a reduction in periodontal pocket depth averaging 0.9 mm after 3 months compared to the control group.

Carotenoids (beta-carotene, lycopene). These compounds are precursors of vitamin A and possess pronounced antioxidant activity. Lycopene, found in tomatoes and watermelons, is particularly effective in neutralizing singlet oxygen. Studies show that patients with chronic periodontitis who received supplemental lycopene (8–10 mg/day) had significantly reduced probing depth and improved gingival margin condition. Source foods: carrots, pumpkin, tomatoes (especially after heat treatment), apricots, spinach.

Flavonoids (quercetin, catechins). Polyphenolic compounds found in green tea, onions, apples, citrus fruits, berries (blueberries, cranberries, raspberries). Green tea catechins inhibit the growth of Porphyromonas gingivalis – a key pathogen in periodontosis – and also inhibit the activity of matrix metalloproteinases that destroy collagen. Clinical observations showed that daily consumption of 2–3 cups of green tea for 4 months was accompanied by a 35% reduction in

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gingival bleeding and a decrease in the level of pro-inflammatory cytokines in the gingival crevicular fluid.

Limitations. Most studies were conducted on small samples and over a short period (up to 6 months). Long-term randomized trials are needed to confirm the sustained effect. It is also important to consider that excessive intake of synthetic antioxidants can be harmful – preference should be given to natural sources.

Conclusion

Oxidative stress plays an important role in the pathogenesis of periodontosis, and correcting the antioxidant status through nutrition is a pathogenetically justified method of prevention and treatment.

Key dietary antioxidants that significantly affect the condition of the periodontium are vitamin C, vitamin E, carotenoids, flavonoids, and selenium. Their synergistic action enhances anti-inflammatory and tissue-protective effects.

Incorporating fresh vegetables, fruits, berries, nuts, unrefined oils, and green tea into the daily diet can reduce gingival bleeding, slow bone resorption, and improve the outcomes of standard periodontal therapy.

It is recommended to inform patients with periodontosis about the importance of an antioxidant-rich diet and provide specific lists of foods with recommended consumption frequency.

Promising directions for further research include studying the role of phytochemicals (resveratrol, curcumin) in periodontosis, as well as the development of specialized nutraceutical complexes for dental patients.

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