

Alzheimer's Disease and Periodontal Health

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Patients with periodontitis (a disease that affects the supporting tissues of the teeth) have a 1.7 to 3 times greater risk of developing Alzheimer's disease (AD) than patients without periodontitis [1]. AD is a primary degenerative brain disease characterized by a progressive decline in cognitive functions such as memory, thinking, understanding, calculation, language, ability to learn, and discernment [1].

Case-control studies have confirmed the hypothesis that periodontitis is associated with this neurodegenerative condition [2,3]. Recent study results highlight the importance of dental treatment for AD patients, calling for attention among dental healthcare professionals (3). The main biological pathways observed among these clinical entities are the chronic inflammatory responses present in untreated periodontitis that can promote neuroinflammation, which is further enhanced by the presence of specific microorganisms such as *Porphyromonas gingivalis* (Pg) [4,5].

Li et al. [4] reported that the disruption of the blood-brain barrier present in Alzheimer's disease facilitates communication between the brain and the peripheral blood. The authors discussed inflammatory factors act as a bridge. Its hypothesis suggests the abnormal activation of microglia, the release of inflammatory mediators, and damage to astrocytes, which leads to blood-brain barrier impairment and subsequently triggers systemic inflammation. A direct connection with bone tissue and Alzheimer's disease was also reported by the authors. Bone is one of the tissues present in the periodontium. They suggested an inflammatory bridge between brain and bone health by analyzing oxidative stress, macrophage autophagy and lysosomal function, and calcium ion dysregulation.

Previous studies demonstrated that Pg external membrane vesicles divert the host's innate immunity and promote more inflammation [4,5]. All living cells and some types of microorganisms (gram-negative) have a structure that separates the interior from the external environment. It

is generally composed of a semipermeable lipid bilayer, proteins, and carbohydrates. This structure called the external membrane, regulates what enters and leaves the cell and protects it, in addition to participating in communication between cells/microorganisms and the transport of substances. Coats et al. [5] suggest that *Pg* produces a type of lipid in its outer membrane that can transport host inflammatory receptors (Toll-like receptor 4 - TLR4), which increases the survival of this bacterium. Nevertheless, the authors reported that *Porphyromonas gingivalis* releases outer membrane vesicles that bypass other host defense mechanisms against the microorganism, such as inflammasome and LL-37 response, and drive alveolar bone loss related to periodontitis [5].

The interrelation between general health and oral health has been highlighted for some years, demonstrating the importance of multidisciplinary teamwork among the different areas of health. The Spanish Societies of Periodontology and Neurology recommend that patients diagnosed with neurological disorders should adhere to a regular program of visits to the dentist for treatment, maintenance, and prevention of periodontal diseases [1].

Loss of motor coordination and/or muscle stiffness compromises the quality of oral hygiene in an individual who is already neglecting everything related to himself. For this reason, the oral health status is significantly compromised in these patients [6]. The procedures for dental care include:

- Treatment sessions should be as short as possible, the environment should be familiar to the patient, and it is desirable for a relative to be present.
- The greatest amount of work should be performed in the shortest possible time and dietary guidance is recommended since caloric intake increases gradually.
- Provisional work should not be performed, only definitive work, avoiding continuous returns and long-term treatment.
- Dentures should be cleaned by other people and mouthwash should be encouraged.
- The patient should be carefully observed to detect oral signs and symptoms, which he or she generally does not report due to inability.
- This painful manifestation is most often noticed by the patient refusing to eat, touching the face, or refusing to brush the teeth (typical signs).

Oral changes and the patient's needs depend on the clinical manifestations and activity of the disease at each moment. Early and accurate diagnosis, as well as better knowledge of immunological abnormalities, has contributed to improving patient treatment [6]. By considering each patient's special needs, the dentist will be able to comprehensively analyze the special dental needs of his/her patients and adapt the treatment according to their particular characteristics.

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