Microbes and Infectious Diseases 2023; Article-In-Press, **DOI:** 10.21608/mid.2023.248880.1662

Microbes and Infectious Diseases

Journal homepage: https://mid.journals.ekb.eg/

Letter to the Editor

Oral bacteria-related systemic diseases:A therapeutic prospect

Yasuhiro Horiuchi*

1- Division of Dermatology, Tsuruse Orthopedic Clinic, 201-11 Fujikubo, Miyoshi, 354-0041 Saitama, Japan.

LETTER INFO

Letter history:
Received 15 November 2023
Received in revised form 21 November 2023
Accepted 21 November 2022

To the Editor

Recently, evidence has suggested that periodontal disease, such as periodontitis, may be associated with other systemic diseases [1] (Fig. 1) such as Alzheimer's disease (AZ disease) [2]. A recent study [3] reported that palmoplantar pustulosis (PPP), a unique chronic inflammatory disease characterized by pustules on the palms and soles [3] (Fig. 1), may be caused by oral bacteria. Periodontal bacteria, which colonize in the mouth [1,2,3], can no longer be overlooked as indigenous bacteria. Here, the author discusses the relationship between periodontal bacteria and systemic diseases.

Alzheimer's disease is mainly caused by the accumulation of amyloid in the brain [2], although it can be accompanied by some inflammatory reaction. Moreover, it has been suggested that oral bacteria are involved in the occurrence of PPP due to leukocyte-mediated inflammation. The implementation of an ozone treatment can cure the disease completely within several months [3]. The pathogenesis of these systemic diseases caused by oral bacteria is very different from that of leukocyte-mediated inflammation in PPP [3], but in AZ disease [2], accumulation of bacterial components and immune reactants occurs. Therefore, in AZ disease, there is a possibility that oral sterilization will not be effective because the accumulated complexes cannot be removed even by eradicating causative bacteria by ozone water oral rinsing.

The author encountered two patients with oral bacteria-related systemic diseases that were affected by poor oral conditions. The first patient was a 92-year-old woman with severe Alzheimer-type dementia, wherein she could not even recognize herself. Oral ozone water rinse was performed with the family's consent. The other case was that of a 56-year-old obese man with type 2 diabetes (weight: 95 kg; high HbA1c level: 8–9%). The patient was willing to undergo periodontal treatment using ozone water. No improvement was observed in the symptoms of both AZ disease and diabetes even after cleaning treatment for a period of 4 months. In diabetes, the immune complex under oral bacteria influence would lead to the progression of the disease, leading to disruption of islet cell functions in the pancreas. Even if oral bacteria possibly responsible for diabetes are sterilized with ozone water, the impaired pancreatic islet function cannot be recovered and the symptoms may not improve, although the possibility of the involvement of intestinal bacteria has not been completely denied. It has been pointed out that the treatment of periodontitis is associated with reduced HbA1c level of approximately 0.4% only [4]. Recently, it has been reported that component substances of *Porphyromonas gingivalis* (*P. gingivalis*) can contribute to the development of AZ disease, but *P. gingivalis* has walls with an oxidation-resistant structure [5]. Even if *P. gingivalis* is an oxidation-

DOI: 10.21608/MID.2023.248880.1662
* *Corresponding author:* Yasuhiro Horiuchi
E-mail address: *tshoriuchi15@gmail.com*

tolerant bacterium, precautions should be taken before AZ disease and type 2 diabetes onset.

In conclusion, it is assumed that the immune response to the components of causative bacteria differ individually, as the pathogenic mechanism differs depending on the individual disease. It is necessary to reconsider the importance and difficulty of oral care for the treatment of systemic diseases caused by oral bacteria.

Ethics and consent

This institution completed a clinical study of palmoplantar pustulosis using nano-ozone water under the approval of the Japan Medical Association Ethics Committee. However, Altzheimer's disease and type 2 diabetes cannot be obtained by accumulating cases and obtaining approval from an ethical review. The patients' consent to ozone oral rinse was obtained from her daughter of a 92-year-old patient, and a 56-year-old patient in verbally. The ozone nanobubble water oral rinse was performed with the patient's family member or patient own discretion and volition, and in the accordance with the Helsinki Declaration.

Acknowledgments

The author thanks Editage for English language editing.

Declaration of competing interest: None.

Funding: None.

References

1- **Bourgeois D, Inquimbert C, Ottolenghi L, Carrouel F.** Periodontal pathogens as risk factors of cardiovascular diseases, diabetes, rheumatoid arthritis, cancer, and chronic obstructive pulmonary disease-Is there cause for consideration? Microorganisms 2019; 7 (10): 424.

2- **Matsushita K, Yamada-Furukawa M, Shikama Y.** Periodontal disease and periodontal disease-related bacteria involved in the pathogenesis of Alzheimer's disease. J Inflamm Res 2020; 13: 275-83.

3- **Horiuchi Y.** Palmoplantar pustulosis treated with oral rinse using ozone nanobubble water: A case series. Dermatol Ther 2020; 33(6): e13924.

4- **Preshaw PM, Alba AL, Herrera D, Jepsen S, Konstantinidis A, Makrilakis K, et al.** Periodontitis and diabetes: a two-way relationship. Diabetologia. 2012; 55(1): 21-31.

5- **Henry LG, McKenzie RME, Robles A, Fletcher HM**. Oxidative stress resistance in *Porphyromonas gingivalis*. Future Microbiol 2012; 7 (4):497-512.

Figure 1. Representative illustration of systemic diseases, periodontal diseases and oral bacteria.