

# Association of Bacteria with Periodontal-Disease

## Abstract

Infection with periodontal-disease-associated bacteria (PDAB) like *Porphyromonas gulae* and *Porphyromonas macacae* results in the most common oral disease known as periodontal disease (PD). Dissimilar to people, most canines don't follow everyday oral cleanliness schedule, and this outcomes in many canines being impacted by PD. Therefore, controlling PDAB is essential for PD prevention. Xylitol is a sugar alcohol that prevents oral bacteria from growing in humans. However, dogs are poisoned by xylitol, and it can cause hypoglycaemia and liver failure. The growth of PDAB isolated from dogs with PD is inhibited by erythritol, a sugar alcohol that can be used safely in dogs. The distribution of PDAB was examined after oral bacteria were isolated from dogs with Parkinson's disease's oral cavities. It's interesting to note that dog samples did not contain the bacterium *Porphyromonas gingivalis*, which typically causes Parkinson's disease in humans. On isolated PDAB, in vitro bacteriostatic effects of erythritol supplementation were investigated. According to our findings, erythritol has a bacteriostatic effect on PDAB that is comparable to that of xylitol. As a result, erythritol could be used in the future to control PDAB in dogs.

**Keywords:** Periodontal disease • *Porphyromonas glue* • Erythritol supplementation

## Introduction

Periodontal sickness (PD) is perhaps of the most well-known oral illness in the two people and canines [1]. Periodontitis is an irreversible condition that causes the destruction of periodontal tissues such as the cementum, periodontal ligament, and alveolar bone. Gingivitis is a reversible condition that involves gingival inflammation. Periodontitis is a complicated infection because of the simultaneous involvement of numerous factors [1- 4]. It is essential to maintain good oral hygiene, which includes brushing one's teeth on a daily basis [5- 7]. Due to the difficulty of maintaining a daily oral hygiene routine in dogs, nearly all of them will develop PD at some point in their lives. Consequently, dogs with severe PD require invasive and anesthetic-assisted surgical treatment. Consequently, it is basic to foster viable techniques to forestall PD in canines.

Plaque and tartar on the teeth contain bacteria that are associated with periodontal disease (PDAB). Gingivitis is caused by these bacteria, and as PD progresses, inflammation spreads to the teeth's supporting tissues, resulting in periodontitis. As a result, dental plaque is a significant target for PD prevention. In order to reduce plaque, the bacteria that produce it must be inhibited. The majority of pathogenic oral bacteria are *Porphyromonas gulae* and *Porphyromonas gingivalis*. *Porphyromonas macacae*, also known as *Porphyromonas salivosa*, was recently discovered in the oral cavity of dogs with Parkinson's disease. Controlling these *Porphyromonas* spp., according to some, may prevent the formation of plaque and slow the progression of PD. As a result, stopping these bacteria from growing could be a good way to stop Parkinson's disease. According to a number of studies, sugar alcohols like xylitol stop the growth of harmful oral bacteria, including cariogenic microorganisms, in humans. Sugar alcohols bacteriostatically affect various microorganisms, and they are really and broadly utilized in everyday oral consideration in people. However, because it causes life-threatening hypoglycemia and acute liver failure in dogs, xylitol cannot be used. Erythritol, a sugar alcohol like xylitol, is not metabolized and is effectively excreted by the kidney. As a result, hypoglycaemia is highly unlikely. Therefore, it has been reported that dogs can use erythritol safely. Erythritol might be a good way to stop PD in dogs; However, there

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is no evidence that erythritol stops PDAB from growing [8-10].

Bacterial DNA was extricated from the separated dark pigmented settlements utilizing a soluble treatment and warming strategy. After adding 50 mL of 50 mM NaOH to the bacterial pellet, the mixture was incubated for 30 minutes at 95 °C. Thusly, 12.5 µL of 1 M Tris-HCl (pH 7.5) was added, and the arrangement was blended well. The periodontopathogens were identified by PCR on the extracted DNA. Using the nucleotide sequences of the 16S rRNA genes of *P. gulae* ATCC 51700 and *P. macacae* ATCC 33141, we developed primers based on the 16S rRNA gene for either *P. gulae* or *P. macacae*. The targeted DNA sequences that distinguish *P. gulae* from *P. macacae*. S1B. KOD One (Toyobo, Osaka, Japan) was used for PCR amplification under the following conditions: an underlying denaturation at 95 °C for 30 s, trailed by 30 cycles at 98 °C for 10 s, 60 °C for 5 s, and 68 °C for 15 s. The PCR items were settled by means of electrophoresis utilizing a 2.5% agarose gel, and the amplicon not set in stone. PCR was repeated with universal primers (27F/519R) for bacterial 16S rRNA if neither set produced an amplicon of the appropriate size, and amplicons were subjected to agarose gel electrophoresis. Using the FastGene gel/PCR extraction kit (NIPPON Genetics, Tokyo, Japan), PCR products was extracted from the agarose gel in accordance with the manufacturer's instructions. A BLAST search was used to identify bacteria with matching sequences after the extracted PCR products were sequenced [11-14].

The growth of the isolated PDAB was examined at various erythritol concentrations to assess the bacteriostatic effect of erythritol on oral bacteria. For the purpose of comparison, the same amounts of xylitol were utilized. Erythritol and xylitol inhibited the growth of pre-isolated mixed cultures, indicating that erythritol is effective against a variety of oral bacteria. There were significant differences between the pre-isolated mixed cultures and the control at erythritol concentrations of 0.1% and over 1%, as well as at xylitol concentrations of over 1% levels. 5% and 10% erythritol reduced *P. gulae* growth by 30% and 41%, respectively, after 24 hours of incubation. In a similar vein, growth inhibition of 23% and 32%, respectively, at 5% and 10% xylitol after 24 hours of incubation[15-17].

## Discussion

If its effectiveness against PDAB is established, erythritol could be used to prevent Parkinson's

disease. To this end, we refined *P. gulae* and *P. macacae* anaerobically with various weakening of erythritol in fluid medium to affirm its impact on PDAB in canines. *P. gingivalis*, which is typically found in people who have periodontitis, was not found in this study. This is in line with a previous study that found *P. gulae* and *P. macacae* outnumbered *P. gingivalis* in the periodontal tissues of dogs with Parkinson's disease. This suggests that, while erythritol inhibits *P. gingivalis* growth, macacae inhibition may be more effective in preventing PD in dogs. With 1% erythritol in the medium (the minimum concentration at which inhibition was observed in the two isolated bacteria), the effect of glucose on the inhibitory effect of erythritol on bacterial growth was examined. The addition of glucose neutralized the inhibitory effect of erythritol. Sugar alcohols like xylitol, for example, are thought to be repressed by glucose in their transport and catabolic activities. This explains the findings of our investigation, and as a result, the manner in which erythritol inhibits *P. gulae* and *P. macacae* is comparable to that of xylitol. Based on our findings, it appears that erythritol bacteriostatic effect may be diminished in an oral environment with high glucose levels.

## Conclusion

Establishing a method for administering erythritol to dogs to prevent Parkinson's disease (PD) and demonstrating its effects in vivo are necessary if erythritol is to be used in the treatment of periodontitis in dogs in the future. Erythritol can be given to dogs in a variety of ways. One option is to cover the tooth surface with erythritol-containing toothpaste or gel. The plaque and erythritol would be in complete contact with each other using this method. Dental gum may also benefit from including erythritol in its formulation. Erythritol can also be given to the dog diluted in water. This is a simple technique to carry out, however it is important to check that erythritol is viable in reaching the plaque. In this instance, dogs are not harmed even when erythritol is administered at a concentration of 1-10%, which is the range of concentrations that inhibit bacterial growth. This research has some limitations. Erythritol was found to inhibit the growth of *P. gulae* and *P. macacae*, two bacterial species isolated from PD-positive dogs, but not other PDAB. Additionally, the model was straightforward and involved diluting erythritol in the culture medium.

## Declaration of Interest

The authors declare no conflict of interest.

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## References

- Petersen PE, Yamamoto T. Improving the oral health of older people: The approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol.* 33, 81–92(2005).
- Nascimento GG, Leite FRM, Vestergaard P *et al.* Does diabetes increase the risk of periodontitis? A systematic review and meta-regression analysis of longitudinal prospective studies. *Acta Diabetol.* 55, 653–667(2018).
- Cassolato SF, Turnbull RS. Xerostomia: Clinical Aspects and Treatment. *Gerodontology.* 20, 64–77(2003).
- Tavares M, Calabi KAL, Martin LS. Systemic Diseases and Oral Health. *Dent Clin N Am.* 58, 797–814 (2014).
- Preshaw PM, Alba AL, Herrera D *et al.* Periodontitis and diabetes: A two-way relationship. *Diabetologia.* 55,21–31(2011).
- Qiao Y, Wang Z, Li Y *et al.* Rheumatoid arthritis risk in periodontitis patients: A systematic review and meta-analysis. *Jt. Bone Spine.* 87, 556–564 (2020).
- Hussain SB, Botelho J, Machado V *et al.* Is there a bidirectional association between rheumatoid arthritis and periodontitis? A systematic review and meta-analysis. *Semin Arthritis Rheum.* 50, 414–422 (2020).
- Petersen PE, Bourgeois D, Ogawa H *et al.* The global burden of oral diseases and risks to oral health. *Bull World Health Organ.* 83, 661–669(2005).
- Kailembo A, Preet R, Williams JS (2017) Common risk factors and edentulism in adults, aged 50 years and over, in China, Ghana, India and South Africa: Results from the WHO Study on global AGEing and adult health (SAGE). *BMC Oral Health.* 17, 1–16.
- Glick M, Williams DM, Kleinman DV *et al.* A new definition for oral health developed by the FDI World Dental Federation opens the door to a universal definition of oral health. *J Am Dent Assoc.* 147,915–917(2016).
- Lamster IB Geriatric periodontology: How the need to care for the aging population can influence the future of the dental profession. *Periodontology.* 72, 7–12(2016).
- Bahareh T, Abbasali K, Sadaf F. Status of geriatric education and meeting the standards of facilities in dental schools. *J Educ Health Promot.* 8, 163 (2019).
- Roglic G. WHO Global report on diabetes: A summary. *Int J Noncommun Dis.* 1, 3(2016).
- Napeñas JJ, Brennan MT, Elad S. Oral Manifestations of Systemic Diseases. *Dermatol Clin.* 38, 495–505 (2020).
- Kane S (2017) The effects of oral health on systemic health. *Gen Dent.* 65, 30–34.
- Emrich LJ, Shlossman M, Genco RJ. Periodontal Disease in Non-Insulin-Dependent Diabetes Mellitus. *J Periodontol.* 62, 123–131(1991).
- Rodrigues CF, Rodrigues ME, Henriques M. Candida sp. Infections in Patients with Diabetes Mellitus. *J Clin Med.* 8, 76(2019).