



OPEN ACCESS

EDITED AND REVIEWED BY

Francisco Nociti,
ADA Science & Research Institute, American
Dental Association, United States

REVIEWED BY

Jacqueline W. Mays,
National Institutes of Health (NIH),
United States

*CORRESPONDENCE

Thaís Manzano Parisotto
✉ thais.parisotto@usf.edu.br

RECEIVED 22 February 2024

ACCEPTED 21 March 2024

PUBLISHED 09 April 2024

CITATION

Crescente CL, Nobre-dos-Santos M,
Carvalho FG, Murata RM, Alves LA and
Parisotto TM (2024) Editorial: The
interaction between the oral microbiota
and systemic diseases.
Front. Dent. Med 5:1390188.
doi: 10.3389/fdmed.2024.1390188

COPYRIGHT

© 2024 Crescente, Nobre-dos-Santos,
Carvalho, Murata, Alves and Parisotto. This is
an open-access article distributed under the
terms of the [Creative Commons Attribution
License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Editorial: The interaction between the oral microbiota and systemic diseases

Camila Lopes Crescente¹, Marinês Nobre-dos-Santos²,
Fabíola Galbiatti Carvalho³, Ramiro Mendonça Murata⁴,
Lívia Araujo Alves⁵ and Thaís Manzano Parisotto^{1*}

¹Laboratory of Clinical and Molecular Microbiology, University São Francisco, Bragança Paulista, Brazil, ²Department of Pediatric Dentistry, University of Campinas, Piracicaba, Brazil, ³Department of Pediatric Dentistry, Federal University of Uberlândia, Uberlândia, Brazil, ⁴Department of Foundational Science, ECU School of Dental Medicine, Greenville, NC, United States, ⁵Odontology Post Graduation Program, University of Cruzeiro do Sul, São Paulo, Brazil

KEYWORDS

bacteria, oral health, systemic disease, microorganism, humans

Editorial on the Research Topic

The interaction between the oral microbiota and systemic diseases

The oral cavity harbors one of the human body's most diverse and complex microbial communities and is usually in homeostasis with the host. However, dysbiotic conditions can lead to severe oral and systemic infections. Interestingly, many systemic conditions manifest in the mouth, exacerbating oral diseases and highlighting the oral cavity's role as an indicator of systemic disturbances.

The present research topic comprises five published papers: two studies involving human subjects, one animal, and two mini-reviews from North and South American researchers at schools of Medicine, Dentistry, and Biomedical Sciences. The comprehensive mini-review entitled "Oral dysbiosis and systemic diseases" (Georges et al.) explores the connection between metabolic diseases (diabetes mellitus and cardiovascular problems) and immunologic conditions (Lupus and Sjogren's syndrome) with oral microbial dysbiosis. The work of Georges et al. reveals a strong correlation between dysbiosis in the oral environment and the pathogenesis of systemic diseases. For instance, the dysbiosis of the mouth environment may exacerbate the pathogenesis of systemic diseases. In this sense, periodontal disease could be worsened as a consequence of unbalanced type II diabetes. Similarly, other inflammatory/autoimmune systemic problems might favor xerostomia, mouth mucositis, mucosal ulcers, and enhanced susceptibility to oral infections (Georges et al.).

Another significant contribution to this research topic emphasizes that changes in the oral microbiome resulting from shifts in an individual's lifestyle can extend beyond local impacts on oral tissues, potentially interacting with intestinal microbes and influencing systemic environments (Reis et al.). An example of a substantial lifestyle change was the COVID-19 pandemic, with social isolation enforced as a protection measure. This period posed a particular challenge for children. As suggested in the mini-review by Reis et al., "Possible Relationship Between the Oral and Gut Microbiome, Caries Development, and Obesity in Children During the COVID-19 Pandemic", environmental and social factors can significantly impact the health-disease process mainly because of

changes in the dietary habits and the immune system, culminating in diseases such as caries and obesity.

Furthermore, within the context of COVID-19, investigations have explored changes in oral/nasopharyngeal bacteria during and after SARS-CoV-2 infection, comparing them with those in healthy individuals (Callahan et al.; 1, 2). The salivary microbiome, known to be relatively stable in adults, could change when exposed to SARS-CoV-2. In addition, the virus impacted abilities/characteristics of the oral environment, including loss of taste, dry mouth, dysgeusia, and opportunistic infections that can alter the microbiota. In this context, an original retrospective pilot study entitled “Oral microbial taxa associated with risk for SARS-CoV-2 infection”, conducted at the University of Illinois—Chicago at the College of Dentistry, noted that salivary bacteria taxa might be associated with an increased risk of SARS-CoV-2 infection in the unvaccinated population (Callahan et al.).

The paper titled “Diet-induced non-alcoholic fatty liver disease and associated gut dysbiosis are exacerbated by oral infection” (Simas et al.) highlights the association between oral infection by *Porphyromonas gingivalis*, a prominent agent in periodontal disease, and the progression of non-alcoholic fatty liver disease (NAFLD). Exploring this relationship, this relevant investigation used a rodent model to demonstrate that infection by *Porphyromonas gingivalis* produces a persistent alteration in the composition of intestinal microbiota, reinforcing the intimate connection between the oral environment, the resident microbiota, and the general systemic condition.

The final study, “Detection and quantification of pathogens in the saliva of adolescents with cerebral palsy: a cross-sectional study involving adolescents” (Yoshida et al.), emphasizes the variability in DNA detection of salivary periodontopathogens in youths with cerebral palsy, particularly considering the presence of *Porphyromonas gingivalis* in individuals with gingivitis. It is common for patients with cerebral palsy to experience gingival inflammation. Gingivitis precedes periodontitis, a disease of challenging treatment, as it relies intimately on the patient’s compliance and requires close periodic monitoring. In the case of cerebral palsy, the caregiver’s compliance in maintaining the patient’s good oral hygiene, together with their already extensive workload, is not easy.

All the exciting manuscripts mentioned above were published in *Frontiers in Dental Medicine* (2022–2023) in “*The Interaction between the Oral Microbiota and Systemic Diseases*” special topic.

References

1. Kumar D, Pandit R, Sharma S, Raval J, Patel Z, Joshi M, et al. Nasopharyngeal microbiome of COVID-19 patients revealed a distinct bacterial profile in deceased and recovered individuals. *Microb Pathog.* (2022) 173:105829. doi: 10.1016/j.micpath.2022.105829

The significant scientific findings enrich our understanding of the complex relationships between oral microbial communities, their surrounding environment, and systemic diseases. We believe this topic provides critical evidence for developing innovative research strategies that not only involve the crosstalk between the oral microbiome and systemic diseases but also encompass various dimensions, including the dysbiosis/host immune response axis, and social determinants of health.

Author contributions

CC: Writing – original draft, Writing – review & editing. MN: Writing – review & editing. FC: Writing – review & editing. RM: Writing – review & editing. LA: Writing – review & editing. TP: Writing – original draft, Writing – review & editing.

Acknowledgments

The editors thank all authors and referees for their terrific contributions to the present *Frontiers Research Topic*.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of *Frontiers*, at the time of submission. This had no impact on the peer review process and the final decision.

Publisher’s note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

2. Armstrong AJS, Horton DB, Andrews T, Greenberg P, Roy J, Gennaro ML, et al. Saliva microbiome in relation to SARS-CoV-2 infection in a prospective cohort of healthy US adults. *EBioMedicine.* (2023) 94:104731. doi: 10.1016/j.ebiom.2023.104731