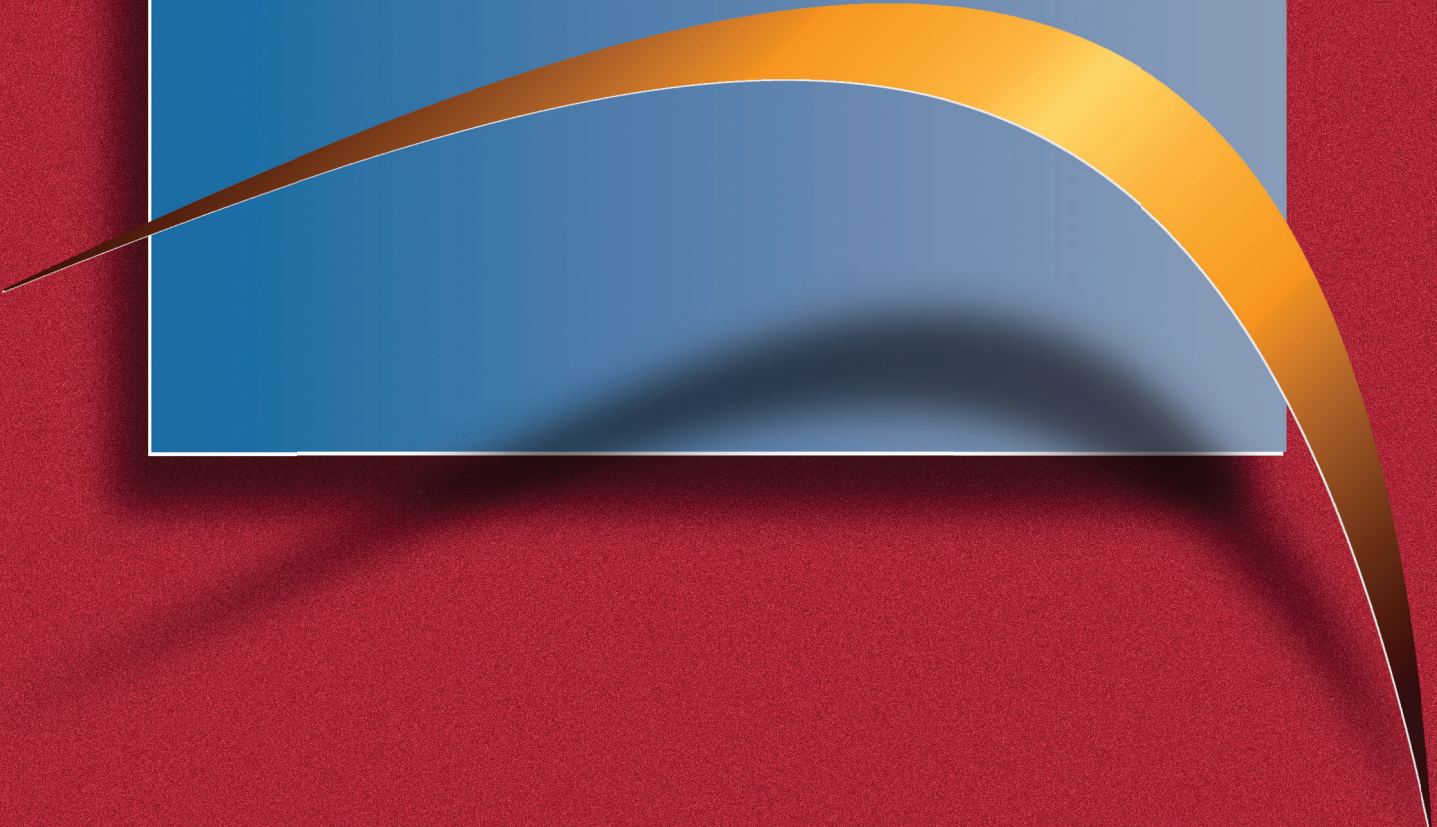


Volume 38 • Supplement 1
2024

Brazilian Oral Research



Official Journal of the SBPqO - Sociedade
Brasileira de Pesquisa Odontológica
(Brazilian Division of the IADR)

Publishing Commission

Scientific Editor

Saul Martins Paiva

Honorary Editor

Esther Goldenberg Birman

Associated Editors

Ana Flavia Granville-Garcia (2020)

Carlos José Soares (2021)

Giulio Gavini (2017)

Giuseppe Alexandre Romito (2019)

Lucianne Cople Maia de Faria (2017)

Luciane Macedo de Menezes (2016)

Luciano José Pereira (2020)

Manoela Domingues Martins (2017)

Mario Tanomaru-Filho (2020)

Matheus de França Perazzo (2024)

Paulo Francisco Cesar (2017)

Sérgio Luís Scombatti de Souza (2018)

Valentim Adelino Ricardo Barão (2019)

Editorial production and Secretary

Ingroup Tecnologia e Serviços Eireli

National Editorial Board

Brenda Paula Figueiredo Almeida Gomes (Universidade Estadual de Campinas - Unicamp, Brazil)

Cláudio Mendes Pannuti (Universidade de São Paulo - USP, Brazil)

Jaime Aparecido Cury (Universidade Estadual de Campinas - Unicamp, Brazil)

Kátia Regina Hostilio Cervantes Dias (Universidade do Estado do Rio de Janeiro - UERJ, Brazil)

Manoel Damião Sousa-Neto (Universidade de São Paulo - USP, Ribeirão Preto, SP, Brazil)

Pedro Luis Rosalen (Universidade Estadual de Campinas - Unicamp, Brazil)

International Editorial Board

Daniel Harold Fine (Rutgers University, Newark, NJ, United States of America)

Hyun Koo (University of Rochester Medical Center, Rochester, NY, United States of America)

Jeroen Kroon (Griffith University, Brisbane, Queensland, Australia)

Maria Elina Itoiz (Universidad de Buenos Aires, Ciudad de Buenos Aires, Argentina)

Mariano Sanz (Universidad Complutense, Madrid, Spain)

Rita Villena Sarmiento (Universidad Peruana Cayetano Heredia, Lima, Peru)

Robert Glenn Quivey Jr. (University of Rochester, Rochester, NY, United States of America)

Saulo Geraldini (University of Florida, Gainesville, FL, United States of America)

Stephen Bayne (University of Michigan, Ann Arbor, MI, United States of America)

The Editorial Board is also composed of ad hoc reviewers, who are

specialized in Dentistry and related areas.



SBPqO®
SOCIEDADE BRASILEIRA DE
PESQUISA ODONTOLÓGICA
DIVISÃO BRASILEIRA DA IADR

Board of Directors

President: Valentim Adelino Ricardo Barão

Vice President: Marcelo Bönecker

Former President: Paulo Francisco Cesar

Secretary: Aldiéris Alves Pesqueira

Treasurer: Cinthia Pereira Machado Tabchoury

Executive Secretary: Cláudio Mendes Pannuti

Executive Director: Kátia Martins Rode

Online Evaluation Coordinator: Wander José da Silva

Social Media Coordinator: Alessandra Pereira de Andrade

Scientific Advisor: Altair A. Del Bel Cury

Ethics Committee Coordinator: Maria Gabriela Haye Biazzevic

Corporate Relations Coordinator: Carlos Eduardo Francci

Digital Marketing Coordinator: João Gabriel Silva Souza

Innovation and Inclusion Policies Coordinator: Isabela Almeida Pordeus

Commission for Positioning on Emerging Issues Coordinator: Rafael

Ratto de Moraes

Secretary Student: Bruna Egumi Nagay

Board of Advisors 2023-2025

Carlos José Soares

Heitor Marques Honório

Ana Flavia Granville Garcia

Manoela Domingues Martins

SBPqO Staff

Eliane Nascimento

Simone Gouveia

Information System Development

Solange Ferreira Paulino

Copyright © All rights reserved to Brazilian Oral Research, including the translated version of each published article. Transcription after publication is, however, allowed with citation of the source.

Indexing

The Brazilian Oral Research is indexed in:

Base de Dados LILACS: 2000-; Bibliografia Brasileira de Odontologia (BBO): 2000-; DOAJ: 2005-; EBSCO Publishing: 2008-; GALE Cengage Learning: 2009-; Index Copernicus: 2008-; Portal de Periódicos CAPES: 2004-; Medline/Pubmed: 2000-; SciELO: 2000-; Scopus: 2000-; Ulrich's: 2000-; Web of Science: 2011-.

Cataloguing-in-publication

Serviço de Documentação Odontológica – Faculdade de Odontologia da Universidade de São Paulo

Brazilian Oral Research. – Vol. 18, n. 1 (Jan./Mar. 2004) – São Paulo : SBPqO : 2004 – Trimestral

ISSN 1806-8324 versão impressa; ISSN 1807-3107 versão online

Continuação de: Pesquisa Odontológica Brasileira = Brazilian Oral Research, 14(2000) – 17(2003).

A partir do vol. 25, n. 1 (Jan./Fev. 2011), a periodicidade passa a ser bimestral. A partir do vol. 29 (2015), a publicação passa a ser exclusivamente online, com fluxo contínuo.

1. Odontologia – Periódicos 2. Sociedade Brasileira de Pesquisa Odontológica

Address for correspondence

Brazilian Oral Research - Editorial Office

Av. Prof. Lineu Prestes, 2.227

Cidade Universitária "Armando Salles de Oliveira"

05508-900 - São Paulo - SP - Brasil

Phone number: (55 11) 3044-2393; (55-11) 97557-1244

E-mail: office.bor@ingroup.srv.br

Instructions to Authors

Available in <http://www.scielo.br/revistas/bor/iinstruc.htm>

E-mail: office.bor@ingroup.srv.br

Site: <https://www.scielo.br/j/bor/>

Disclaimer

The statements and opinions of the manuscripts submitted to and published in the BOR are solely those of the author(s), and not necessarily those of the Editorial Board or of the Sociedade Brasileira de Pesquisa Odontológica (SBPqO), Brazilian Division of the International Association for Dental Research (IADR).

Editorial Production

Ingroup Tecnologia e Serviços Eireli

Support



Universidade de São Paulo
Faculdade de Odontologia

Em 1963 foi publicado o primeiro volume da Revista da Faculdade de Odontologia da Universidade de São Paulo, que teve sua origem na edição de 1963 como Anais da Faculdade de Farmácia e Odontologia da Universidade de São Paulo.



BOR is a member of the
Electronic Journals
Database of SciELO

Sponsors



**Associação Brasileira
de Editores Científicos**



Advancing with the 2024 Latin America and the Caribbean Periodontal Consensus

Claudio Mendes PANNUTI^(a)
Cristina Cunha VILLAR^(a)

^(a)Universidade de São Paulo – USP, School of Dentistry, Department of Periodontics, São Paulo, SP, Brazil.

The first Latin America and the Caribbean Periodontal Consensus, held in 2020,¹ marked a historical milestone in the dentistry of the region. Planned before publication of the 2017 Classification of Periodontal and Peri-Implant Diseases and Conditions,² this consensus brought together experts from across Latin America and the Caribbean to address the unique challenges faced in the region, and its characteristics in managing periodontal diseases. It was a pioneering effort with the aim of creating a common foundation of understanding and practices for a diverse population, reflecting the region's epidemiological, socioeconomic, and cultural realities.

However, the evolution of scientific knowledge and the release of new international guidelines, such as the 2017 Classification of Periodontal and Peri-Implant Diseases² and the 2020 EFP S3-level Clinical Practice Guidelines,³ highlighted the need for a novel consensus. These guidelines introduced significant advances in the understanding and management of periodontal diseases. Consequently, the 2024 Consensus not only updated its recommendations to align with these advances but also adapted these global guidelines to address the specific needs and challenges of our region, ensuring that periodontal practice in Latin America and the Caribbean remains informed about the latest scientific evidence, in addition to tailoring it to the local context.

By addressing the critical aspects of periodontal disease management, the 2024 Consensus covers a wide range of topics, from prevalence, burden, and risk factors through to diagnosis, prevention, and treatment.⁴⁻⁹ In a region where the per capita health expenditure is approximately \$650, significantly lower than the global average of \$1,300, according to the World Health Organization Global Health Expenditure database (2024),¹⁰ and considering that dental expenditure in low-income countries is 500 times lower than it is in high-income countries,¹¹ the consensus underscores the urgent need to optimize both financial and human resources. It is crucial for treatment protocols to be based on the most reliable and current scientific evidence. The consensus advocates for a strategic approach that prioritizes cost-effective, primary care-based interventions, including prevention, early diagnosis, and evidence-based treatments. These strategies have the potential to reduce overall healthcare costs, enhance public health outcomes, and address health inequalities.^{12,13}

In this context, the 2024 Consensus highlighted the prevalence of periodontal diseases in Latin America and the Caribbean, as revealed

Declaration of Interests: The authors certify that they have no commercial or associative interest that represents a conflict of interest in connection with the manuscript.

Corresponding Author:

Cristina Cunha Villar
E-mail: villar@usp.br

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0115>



by a comprehensive review of regional studies.⁴ This review, which analyzed data from 35 studies across 12 countries, emphasized the variability in reported prevalence rates, influenced by factors such as age, methodology, and case definitions. Despite the recent increase in studies with representative samples, the lack of methodological consistency prevents a unified conclusion. This underscores the need for multicenter studies with standardized protocols to enable better understanding and addressing of the region's periodontal disease burden. Consequently, the Consensus recommends collaborative efforts with the aim of enabling countries to conduct studies with reproducible methodologies, thereby ensuring the generation of data that accurately reflects the region's diverse needs and realities.

The 2024 Consensus also delves into the substantial burden and impact of periodontal diseases on both oral health-related quality of life (OHRQoL) and systemic health conditions in Latin America and the Caribbean.⁵ A comprehensive scoping review of the existing research indicated that periodontal diseases, particularly severe periodontitis, are prevalent in the region and negatively impact OHRQoL, contributing to psychological discomfort, and both physical and social disability. Moreover, the review underscored the strong associations between periodontal diseases and various systemic conditions, including diabetes, cardiovascular diseases, and adverse pregnancy outcomes. These findings emphasize the need for integrated healthcare strategies that address both periodontal health and systemic diseases since they reinforce the critical role of periodontal care in improving overall health outcomes in the region.

This Consensus also explored the risk factors contributing to the development and progression of periodontitis in Latin America and the Caribbean by emphasizing the significant role of smoking and diabetes.⁶ A critical review of regionally representative studies revealed a strong association between smoking and periodontitis, particularly among heavy smokers and highlighted smoking as a major risk factor. Although diabetes was also identified as a potential risk factor, the association with periodontitis was less consistent across studies after adjusting for confounding variables. In alignment

with a recent consensus by the European Federation of Periodontology,¹⁴ these findings underscored the need for targeted public health interventions to address smoking cessation and better management of diabetes as part of comprehensive periodontal care strategies in the region. The Consensus calls for more robust, prospective cohort studies to further elucidate these associations and to inform tailored prevention and treatment approaches that address the unique challenges faced by populations in Latin America and the Caribbean

By recognizing the key role of accurate and comprehensive diagnosis, the 2024 Consensus stresses its importance as the cornerstone for effective treatment and management strategies in Latin America and the Caribbean.⁷ Despite advancements in the classification and understanding of periodontal diseases,² the region continues to face significant challenges in diagnosing periodontal diseases and conditions. The underdiagnosis of periodontal diseases, often due to a historical focus on dental caries and the insufficient implementation of diagnostic protocols, remains a concern. The consensus calls for a more rigorous approach, emphasizes the necessity of performing complete periodontal examination and cautions against reliance on partial examination methods since these lead to the risk of underestimating disease prevalence and severity. By prioritizing thorough diagnosis across all levels of care, the 2024 Consensus seeks to enhance treatment outcomes and address the ongoing burden of periodontal diseases throughout Latin America and the Caribbean.

Prevention is another critical focus of the current Consensus, which advocates for integrated public health strategies that address both oral and systemic health.⁸ By incorporating periodontal prevention into broader health promotion programs and addressing shared risk factors such as smoking and poor diet,¹⁵ the consensus aims to reduce the high burden of periodontal diseases in the region. It also underscores the importance of community-based initiatives and active involvement of dental professionals in empowering patients and promoting self-care. Furthermore, the consensus recognizes the necessity of developing and implementing tailored preventive strategies that consider the region's diverse

socioeconomic and cultural landscape, as well as the unique challenges posed by different life stages.

In alignment with the European Federation of Periodontology (EFP) S3-level clinical practice guidelines,³ the 2024 Consensus further advocates for a patient-centered, multifaceted approach tailored to the unique challenges faced by Latin American and Caribbean populations.⁹ This approach spans a continuum of care, from self-care and non-surgical interventions through to surgical treatments, all based on the latest scientific evidence. The consensus highlights the vital role of supportive periodontal care (SPC) in maintaining long-term oral health, particularly by addressing the factors that contribute to non-adherence, which is a significant issue in this region. Moreover, it acknowledges existing oral health policies in several Latin America and Caribbean countries (LACC), such as Brazil's Family Health Strategy

(FHS) and the Dental Specialties Centers (DSCs), while also emphasizing the persistent challenges, including limited access to primary and specialized care services. To address these obstacles, the 2024 Consensus advocates for the enhancement of existing policies to optimize resource allocation and promote equitable access to high-quality periodontal care across the region.

As we move forward, the 2024 Consensus represents a decisive call to action. It challenges all stakeholders—clinicians, policymakers, educators, and the broader healthcare community—to elevate periodontal care by embracing evidence-based practices tailored to the region's unique realities. By fostering collaboration, prioritizing prevention, and committing to comprehensive and equitable care, we can mitigate the burden of periodontal diseases and enhance the overall health of populations across Latin America and the Caribbean.

References

1. Romito GA, Feres M, Gamonal J, Gomez M, Carvajal P, Pannuti C, et al. Periodontal disease and its impact on general health in Latin America: LAOHA Consensus Meeting Report. *Braz Oral Res.* 2020 Apr 9;34(suppl 1):e027. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0027>
2. Caton JG, Armitage G, Berglundh T, Chapple ILC, Jepsen S, Kornman KS, et al. A new classification scheme for periodontal and peri-implant diseases and conditions: introduction and key changes from the 1999 classification. *J Clin Periodontol.* 2018 Jun;45(suppl 20):S1-8. <https://doi.org/10.1111/jcpe.12935>
3. Sanz M, Herrera D, Kebschull M, Chapple I, Jepsen S, Berglundh T, et al. Treatment of stage I-III periodontitis-The EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2020 Jul;47(22):4-60. <https://doi.org/10.1111/jcpe.13290>
4. Carvajal P, Carrer FCA, Galante ML, Vernal R, Solis CB. Prevalence of periodontal diseases: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e116. [https://doi.org/10.1590/1807-3107bor-2024;38\(suppl\):e116](https://doi.org/10.1590/1807-3107bor-2024;38(suppl):e116)
5. Romito GA, Collins JR, Hassan MA, Benítez C, Contreras A. Burden and impact of periodontal diseases on oral health-related quality of life and systemic diseases and conditions: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e117. [https://doi.org/10.1590/1807-3107bor-2024;38\(suppl\):e117](https://doi.org/10.1590/1807-3107bor-2024;38(suppl):e117)
6. Pannuti CM, Alarcón MA, Ramírez Lemus GM, Yunes Fragoso PM, Retamal-Valdes B, Cornejo-Ovalle M, et al. Risk factors of periodontal disease: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e118. [https://doi.org/10.1590/1807-3107bor-2024;38\(suppl\):e118](https://doi.org/10.1590/1807-3107bor-2024;38(suppl):e118)
7. Rösing CK, Cavagni J, Langa GPJ, Bustillos Torres W, Cepeda Bravo JA. Periodontal disease and its impact on general health in Latin America - diagnosis: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e119. [https://doi.org/10.1590/1807-3107bor-2024;38\(suppl\):e119](https://doi.org/10.1590/1807-3107bor-2024;38(suppl):e119)
8. Duque AD, Chaparro Padilla A, Almeida ML, Marín Jaramillo RA, Romanelli HJ, Lafaurie Villamil GI. Strategies for the prevention of periodontal disease and its impact on general health: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e120. [https://doi.org/10.1590/1807-3107bor-2024;38\(suppl\):e120](https://doi.org/10.1590/1807-3107bor-2024;38(suppl):e120)
9. Fischer RG, Amaral GCLS, Huamán-Mendoza AA, Bueno LR, Villar CC. Treatment of periodontal diseases: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e121. [https://doi.org/10.1590/1807-3107bor-2024;38\(suppl\):e121](https://doi.org/10.1590/1807-3107bor-2024;38(suppl):e121)
10. World Health Organization. Global Health Expenditure database. [cited 2024 Apr 15]. Available from: <https://apps.who.int/nha/database>

11. World Economic Forum, American Dental Association, Colgate-Palmolive Company. The economic rationale for a Global Commitment to Invest in Oral Health: white paper. Geneva: World Economic Forum; 2024 [cited 2024 May 23]. Available from: <https://www.weforum.org/publications/the-economic-rationale-for-a-global-commitment-to-invest-in-oral-health/>
12. Demaio AR, Nielsen KK, Tersbøl BP, Kallestrup P, Meyrowitsch DW. Primary Health Care: a strategic framework for the prevention and control of chronic non-communicable disease. *Glob Health Action*. 2014 Aug;7:24504. <https://doi.org/10.3402/gha.v7.24504>
13. Hou X, Liu L, Cain J. Can higher spending on primary healthcare mitigate the impact of ageing and non-communicable diseases on health expenditure? *BMJ Glob Health*. 2022 Dec;7(12):e010513. <https://doi.org/10.1136/bmjgh-2022-010513>
14. Herrera D, Sanz M, Shapira L, Brotons C, Chapple I, Frese T, et al. Periodontal diseases and cardiovascular diseases, diabetes, and respiratory diseases: Summary of the consensus report by the European Federation of Periodontology and WONCA Europe. *Eur J Gen Pract*. 2024 Dec;30(1):2320120. <https://doi.org/10.1080/13814788.2024.2320120>
15. Cota LOM, Villar CC, Vettore MV, Campos JR, Amaral GCLSD, Cortelli JR et al. Periodontal diseases: is it possible to prevent them? A populational and individual approach. *Braz Oral Res*. 2021 Sep;35(Suppl 2):e098. <https://doi.org/10.1590/1807-3107bor-2021.vol35.0098>

Prevalence of periodontal diseases: Latin America and the Caribbean Consensus 2024

Paola CARVAJAL^(a) 
Fernanda Campos de Almeida CARRER^(b) 
Mariana Lopes GALANTE^(c) 
Rolando VERNAL^(d) 
Cristina Barboza SOLIS^(e) 

^(a)Universidad de Chile, School of Dentistry,
Department of Conservative Dentistry,
Santiago, Chile.

^(b)Universidade de São Paulo – USP, School
of Dentistry, Department of Community
Dentistry, São Paulo, SP, Brazil.

^(c)Universidade de São Paulo – USP, School
of Dentistry, Department of Community
Dentistry, São Paulo, SP, Brazil.

^(d)Universidad de Chile, School of
Dentistry, Periodontal Biology Laboratory,
Santiago, Chile.

^(e)Universidad de Costa Rica, School of
Dentistry, Department of Epidemiology, San
Jose, Costa Rica.

Declaration of Interests: The authors
certify that they have no commercial or
associative interest that represents a conflict
of interest in connection with the manuscript.

Corresponding Author:
Fernanda Carrer
E-mail: fernandacsa@usp.br

Abstract: The aim of this review was to update knowledge about the prevalence of periodontitis in Latin America and the Caribbean. A critical review of was performed of all cross-sectional or cohort studies selected, pertaining to the region, and thirty-five studies conducted in 12 countries were selected. The countries with nationally representative studies were Brazil, Chile, Colombia, and Uruguay. The prevalence of periodontal disease or need for periodontal treatment varied between the different studies and countries depending on the age group, the methodology used, and the case definition. The prevalence of severe periodontitis aged between 5.8% and 49.7% in adults. In adolescents, the prevalence of moderate to severe periodontitis was 15.3%. Furthermore, a high prevalence of gingival bleeding in adolescents was reported. When analyzing the studies that used the Community Periodontal Index (CPI), Centers for Diseases Control and American Academy Periodontology (CDC/AAP) case definition, it was observed that as the age of the individuals analyzed increased, the prevalence of periodontal disease also increased. Whereas this rereview revealed that although the number of regional and nationally representative studies that analyzed the prevalence of periodontitis has risen in recent years, their methodological heterogeneity prevents global conclusions to be drawn concerning the region. Therefore, this ratifies the need to generate alliances between countries with the purpose of joining individual efforts to achieve collective goals which, among other objectives, will translate into conducting multicenter studies. These studies would allow description and monitoring of the epidemiological behavior of periodontitis in Latin America and the Caribbean.

Keywords: Prevalence, Periodontitis, Gingivitis, Latin America, Caribbean Region, Adults, Adolescent.

Introduction

Periodontitis is considered a public health problem given its high prevalence, significant socioeconomic impact since it compromises the quality of life and systemic health of individuals.¹⁻³ Indeed, the high prevalence of severe periodontitis contributes to the global burden of chronic non-communicable diseases.⁴

Although the condition has been intensively studied in high-income countries, there is a scarcity of epidemiological studies analyzing the

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0116>

Submitted: August 17, 2024
Accepted for publication: August 19, 2024
Last revision: September 11, 2024



prevalence of periodontitis in low- and middle-income countries.⁵ This applies particularly to Latin American and Caribbean countries, where there are few data on the prevalence of periodontitis, and methodologies and case definitions have not yet been standardized.⁶⁻⁸ Nevertheless in Latin America, these few studies have reported high prevalence of periodontitis in urban and isolated regions, a situation that is strongly determined by factors such as individuals' education level, socioeconomic status, and income.^{6,7,9} For instance, in 2023 a systematic review was carried out, covering 15 studies with dentate people, conducted in Latin American or Caribbean countries between 2010 and 2021. However, these studies assessed specific populations without any national representation.⁵ In 2015, two critical reviews reported that studies on periodontitis prevalence with national representation were scarce in Latin America.^{6,7} Furthermore, these studies were conducted with substantial methodological heterogeneity, compromising the comparison between countries and regions. In spite of this, they reveal that periodontal attachment loss was more prevalent in Latin America than in the United States and Europe.^{6,7}

Therefore, it is necessary to carry out an updated review of the evidence available, including that which was recently published, in order to have a complete overview of the prevalence of periodontitis in Latin America and thus have helpful information for appropriate decision-making on periodontal health. This study summarizes and discusses the scientific articles published until 2023, which report on the prevalence of periodontitis in adolescents and adults in Latin American and Caribbean countries.

Methods

Information sources and search strategy

One author (PC) performed the electronic search in PubMed and LILACS (Latin-American Scientific Literature in Health Sciences) databases. The following algorithm built with MeSH terms was used for the PubMed search: "(periodontitis OR gingivitis [MeSH] OR 'chronic periodontitis' OR (periodontal

diseases [MeSH]) OR 'attachment loss' OR pocket) AND (prevalence [MeSH] OR epidemiology [MeSH]) AND ('South America' OR Caribbean OR "Latin America")". For LILACS, the following algorithm was used: "ab:((periodontitis OR gingivitis OR 'periodontitis crónica' OR 'enfermedad periodontal' OR 'pérdida inserción periodontal' OR 'bolsa periodontal') AND (prevalence OR epidemiología)) AND (db:("LILACS"))". Furthermore, the same author performed a manual search specifying the name of each Latin American and Caribbean country in the journals from which the initial studies were selected.

Type of studies and inclusion criteria

The eligibility criteria were cross-sectional or cohort epidemiological studies that reported the prevalence of periodontal diseases, as clinical attachment loss (CAL), gingivitis, or periodontitis, in adolescents and/or adults until December 2023, without limit on publication date, no language restriction, with random sampling, and representative of at least one locality, city, region, or country in Latin America or the Caribbean. Moreover, secondary data analysis studies were included when they provided a different result from the original research.

Exclusion criteria

Since the interest of the present study was to identify the general population prevalence, studies that reported it in specific populations (including indigenous people, pregnant women, a population with a particular disease or condition, beneficiaries of a health center, or attendees of a specific university clinic) were excluded. Additionally, literature reviews, studies on self-report of periodontal diseases, and studies in which the case definition used was not specified or was only based on the gingival index were excluded.

Data selection, extraction, and presentation

Preliminarily, relevant articles were selected screening a title and abstract, thus excluding those that were not relevant according to the inclusion and exclusion criteria detailed above.

The full text of all eligible studies were read,, and the reasons for exclusion were presented in detail. The final agreement to exclude articles was made collectively during meetings of the research team.

The studies selected were organized in Tables by age group (adolescents and adults), describing the study characteristics and their main results. Information included: first author's name, publication year, city and country where the analyses were performed, inclusion or exclusion criteria, design, sample size, periodontal examination protocol, age range of participants, periodontal criteria used (periodontal case definition), global prevalence, and prevalence by sex.

In order to standardize and systematize the present study findings, the most used periodontal indicator, Community Periodontal Index (CPI) proposed by the World Health Organization (WHO) for population epidemiological studies,¹⁰ was used as a reference to ensure comparison between countries. This was accomplished by categorizing the results into CPI > 2 and CPI = 4; a person having a CPI > 2 when presenting a probing depth (PD) > 3 mm in at least one sextant and a person having a CPI = 4 when presenting a PD > 5.5 mm in at least one sextant. In addition, results from studies using the Centers for Diseases Control and American Academy Periodontology (CDC/AAP) case definition were independently presented.^{11,12} Mild periodontitis was defined as ≥ 2 interproximal sites with CAL ≥ 3 mm and ≥ 2 interproximal sites with PD ≥ 4 mm (not on the same tooth) or one site with PD ≥ 5 mm. Moderate periodontitis was defined as ≥ 2 interproximal sites with CAL ≥ 4 mm (not on the same tooth) or ≥ 2 interproximal sites with PD ≥ 5 mm (also not on the same tooth). Severe periodontitis was defined as ≥ 2 interproximal sites with CAL ≥ 6 mm (not on the same tooth) and ≥ 1 interproximal site with PD ≥ 5 mm.

Results

Study selection

The initial electronic search strategy yielded 457 articles, 322 from PubMed, 105 from LILACS, and

30 from manual search (Figure 1). These articles were written in English, Spanish, or Portuguese. After removing duplicates, an additional article was discarded because its abstract was inaccessible. Then, 447 articles were identified by screening the title and abstract, and 366 were removed because they did not comply with the inclusion criteria. The full-text assessment resulted in the inclusion of 81 articles. Of these, 46 articles were excluded; and the reasons for exclusion are summarized in Figure 1 and Table 1. Ultimately, 35 articles were included in the present study, of which, 17 reported periodontitis prevalence results in adults,¹³⁻²⁹ 14 in adolescents,³⁰⁻⁴³ and 4 in both populations.⁴⁴⁻⁴⁷

Study characteristics

These 35 studies analyzed populations from 12 of the 33 countries in Latin America and the Caribbean (36.3%), with Chile and Brazil reporting more than one study (Figure 2a). From the 1990s, the number of studies increased, particularly studies reporting secondary analysis of previously published data (Figure 2b). Regarding their methodology, diverse periodontal examination protocols and case definitions were used. The majority of studies ($n=22$) used the CPI index as a case definition (62.9%), three studies (8.6%) used the case definition proposed by Page and Eke¹² for the surveillance of periodontal diseases, and ten studies (28.5%) used other case definitions, including CAL and gingival inflammation (Figure 3). All primary studies described sample size calculation, random selection of participants, examiner training, and funding sources.

Periodontitis prevalence in nationally representative studies

Nationally representative studies were reported in four countries (Table 2): Brazil, Uruguay, Chile, and Colombia.

In Brazil, two studies analyzed data from the Brazilian Oral Health Survey 2010 for ages 35–44 years-old.^{23,28} These studies examined six index teeth, and the CPI and CAL case definitions were used. Vettore et al.²³ reported a prevalence of 15.3% for moderate-to-severe periodontitis (CPI > 2 and CAL ≥ 4 mm) and 5.8% for severe periodontitis

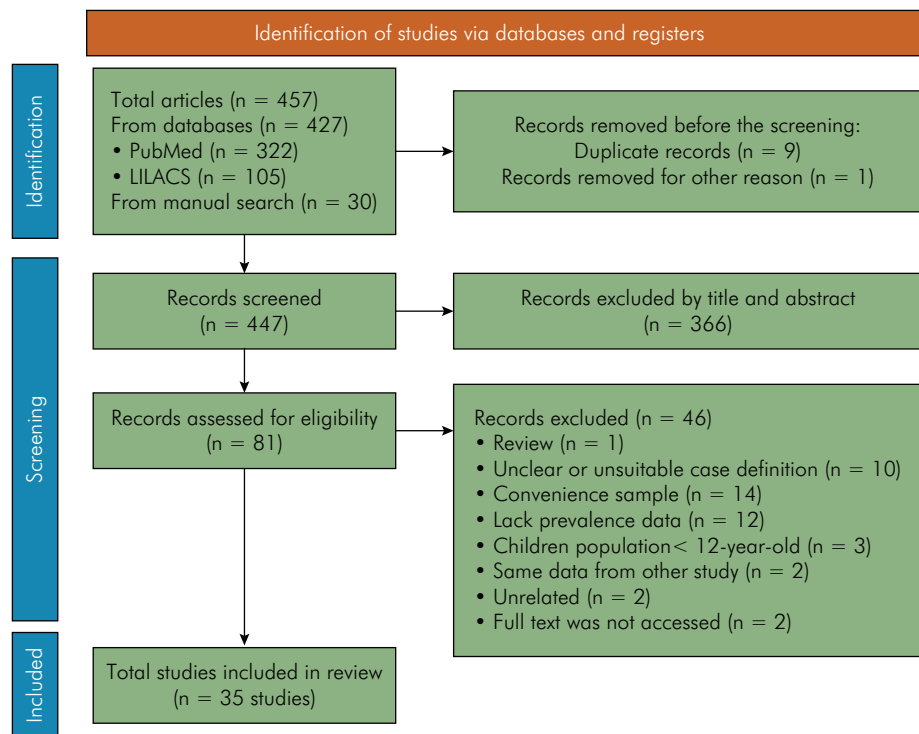


Figure 1. Flow diagram of literature search and selection criteria, based on the PRISMA 2020 statement.⁶³

(CPI > 2 and CAL ≥ 6 mm). For both levels of severity of periodontitis, men showed a higher prevalence. Filgueiras et al.²⁸ reported that 14.5% of the people analyzed had at least two sites with CAL > 3 mm and at least one site with PD > 3 mm, not necessarily at the same periodontal site.

In Uruguay, using the same methodology as Vettore et al., Lorenzo et al.¹⁶ analyzed data from the First National Survey of Oral Health 2010-2011. For ages 35-44 and 65-74 years-old together, a prevalence of 21.8% and 9.1% for moderate-to-severe and severe periodontitis, respectively, were reported. In particular, men had a higher prevalence of moderate-to-severe periodontitis, and women had a higher prevalence of severe periodontitis.

In Chile, Gamonal et al.¹⁹ analyzed data from the First Chilean National Examination Survey 2007-2008, which was carried out using a full-mouth evaluation of six periodontal sites per tooth. For the ages of 35-44 years-old, 93.4% and 38.6% of individuals had at least one periodontal site with CAL > 3 mm or CAL > 6 mm, respectively. For 65-74 years

old, 97.5 and 69.3% of individuals had at least one periodontal site with CAL > 3 mm or CAL > 6 mm, respectively. When a secondary analysis of these data was performed, combining both age groups, Morales et al.⁴⁷ reported a periodontitis prevalence of 88.3% (1.4% for mild periodontitis, 57.2% for moderate periodontitis, and 29.7 for severe periodontitis) using the Page and Eke¹² case definition. Using the classification proposed by the AAP-EFP,⁴⁸ a prevalence of 98.9% was reported, and most individuals were classified as stage IV periodontitis (81.3%).

In Colombia, Serrano and Suarez²⁵ analyzed the Colombian Oral Health Study 2014 data, in which people ≥ 18 years-old received full-mouth evaluation of six periodontal sites per tooth. Using the case definition proposed by Page and Eke,¹² the prevalence of periodontitis was 61.5% (7.3% for mild periodontitis, 43.6% for moderate periodontitis, and 10.6% for severe periodontitis). Among men, the prevalence of severe periodontitis was higher (7.5% versus 13.9%).

Table 1. Excluded studies after full text revision and with their reasons (n = 46).

Authors, year	Country, City	DOI or link	Exclusion criteria
Alonge; Narendran (1999)	St. Vincent and The Grenadines	https://pubmed.ncbi.nlm.nih.gov/11372121/	8
Andrade; Rapp (2002)	District of Barra / Rio Vermelho, Brazil	https://pubmed.ncbi.nlm.nih.gov/12670092/	5
Bonanato et al. (2010)	Belo Horizonte, Minas Gerais, Brazil	https://pubmed.ncbi.nlm.nih.gov/20589245/	2
Carvajal et al. (2016)	South America	doi: 10.1590/1678-775720160178.	2
Castrejón-Pérez et al. (2017)	Mexico	doi: 10.1093/gerona/glw201	3
Chiapinotto et al. (2012)	Brazil, Pelotas	doi: 10.1111/jphd.12001	5
Collins et al. (2019)	Caribbean. Jamaica, Dominican Republic, and Puerto Rico.	doi: 10.1186/s12903-019-0931-1	4
Cortelli et al. (2008)	Brazil	doi: https://doi.org/10.14295/bds.2008.v11i2.448 .	3
Cyrino et al. (2011)	Belo Horizonte, Brazil	doi: 10.1902/jop.2011.110015.	3
Duque (2016)	Latin America	http://dx.doi.org/10.1016/j.piro.2016.07.005 .	1
Elías-Boneta et al. (2017)	San Juan, Puerto Rico	https://pubmed.ncbi.nlm.nih.gov/28915302/	3
Elías-Boneta et al. (2018)	Caribbean. Jamaica, Dominican Republic, and Puerto Rico.	https://pubmed.ncbi.nlm.nih.gov/29905923/	2
Feldens et al. (2006)	Canoas, Brazil	https://pubmed.ncbi.nlm.nih.gov/16734306/	5
Giacaman et al. (2015)	Maule, Chile	https://pubmed.ncbi.nlm.nih.gov/26108477/	4
Giacaman et al. (2018)	Maule, Chile	doi: 10.22605/RRH4312.	6
Gianopoulos et al. (2014)	Santa Ana, Nicaragua	doi: 10.1111/idh.12043	3
Haas et al. (2015)	Brazil	doi: 10.1590/1980-5497201500020018	4
Haas et al. (2019)	Brazil, Porto Alegre	doi.org/10.1590/1807-3107bor-2019.vol33.0036	2
Ismail; Szpunar (1990)	Mexican Americans, Cuban Americans, and Puerto Ricans	doi: 10.2105/ajph.80.suppl.66.	7
Lock et al. (2020)	Brazil, Porto Alegre	doi: 10.1111/jre.12743	2
Lopez et al. (2002)	Santiago, Chile	doi: 10.1034/j.1600-0765.2002.01377.x.	2
Lorenzo-Erro (2022)	Uruguay	doi: 10.54589/aol.35/3/178.	2
Lorenzo-Erro (2018)	Uruguay	doi: 10.1590/1807-3107bor-2018.vol32.0062.	7
Maltz et al. (2001)	Porto Alegre, Brazil	doi: 10.1007/s007840100122.	4
Medeiros et al. (2022)	Brazil	doi: 10.1002/JPER.21-0433.	4
Medina-Solís et al. (2014)	Mexico	doi: 10.3390/ijerph110303169	4
Moreira et al. 2009	Southeastern Sao Paulo State, Brazil	doi: 10.1590/s1678-77572009000300008.	4
Moreno de Calafell; Esper (2003)	Argentina	https://pesquisa.bvsalud.org/portal/resource/pt/lil-349312	8
Mota et al. (2014)	Minas Gerais, Brazil	doi: 10.1590/1413-81232014197.09312013.	4
Nobre et al. (2016)	Brazil	doi: 10.1007/s40368-016-0248-6.	3
Peres et al. (2012)	Pelotas, Brazil	doi: 10.1902/jop.2011.110250.	4
Rapp et al. (2001)	Bahia, Brazil	https://pubmed.ncbi.nlm.nih.gov/12666945/	3
Nascimento A, et al. (2022)	Brazil	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9568304/	4
Rebelo et al. (2009)	Manaus, AM, Brazil	doi: 10.1590/s1806-83242009000300005.	2

Continue

Continuation			
Rojo Botello et al. (2011)	Mexico	https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-199X2011000100006	3
Sabogal et al. (2019)	Peru	doi: 10.1155/2019/2357013	3
Santosh et al. (2020)	Caribbean. Jamaica, Dominican Republic, and Puerto Rico.	doi: 10.1177/0272684X19895901.	4
Segundo et al. (2004)	Contagem, Minas Gerais, Brazil	doi: 10.1590/s0102-311x2004000200029.	3
Silva; Maltz (2001)	Porto Alegre, Brazil	https://pubmed.ncbi.nlm.nih.gov/11705268/	4
Silva-Boghossian et al. (2011)	Brazil	https://pubmed.ncbi.nlm.nih.gov/22068186/	3
Souza; Taba Jr. (2004)	Brazil	doi: 10.1590/s0103-64402004000100009.	3
Strauss et al. (2009)	Chile	doi.org/10.1186/s12903-019-0975-2	6
Susin; Albandar (2005)	Brazil, Porto Alegre	doi: 10.1902/jop.2005.76.3.468	2
Teixeira et al. (2019)	Sao Paulo, Brazil	https://doi.org/10.6084/m9.figshare.11314157.v1	3
Teixeira et al. (2020)	Sao Paulo, Brazil	doi: 10.1590/1807-3107bor-2020.vol34.0058	3
Tinoco EM et al. (1997)	Brazil	doi: 10.1111/j.1600-0722.1997.tb00174.x.	2

The studies described in Table 1 are not included in the “references” section. These studies were excluded in the selection process. This table was kept in the manuscript to ensure transparency for the reader.

Reasons for exclusion: 1 - Reviews; 2 - Unclear or unsuitable case definition; 3 - Convenience sample; 4 - Lack prevalence data; 5 - Children population < 12-year-old; 6 - Same data from other study; 7 - Unrelated; 8 - Full text not accessed.

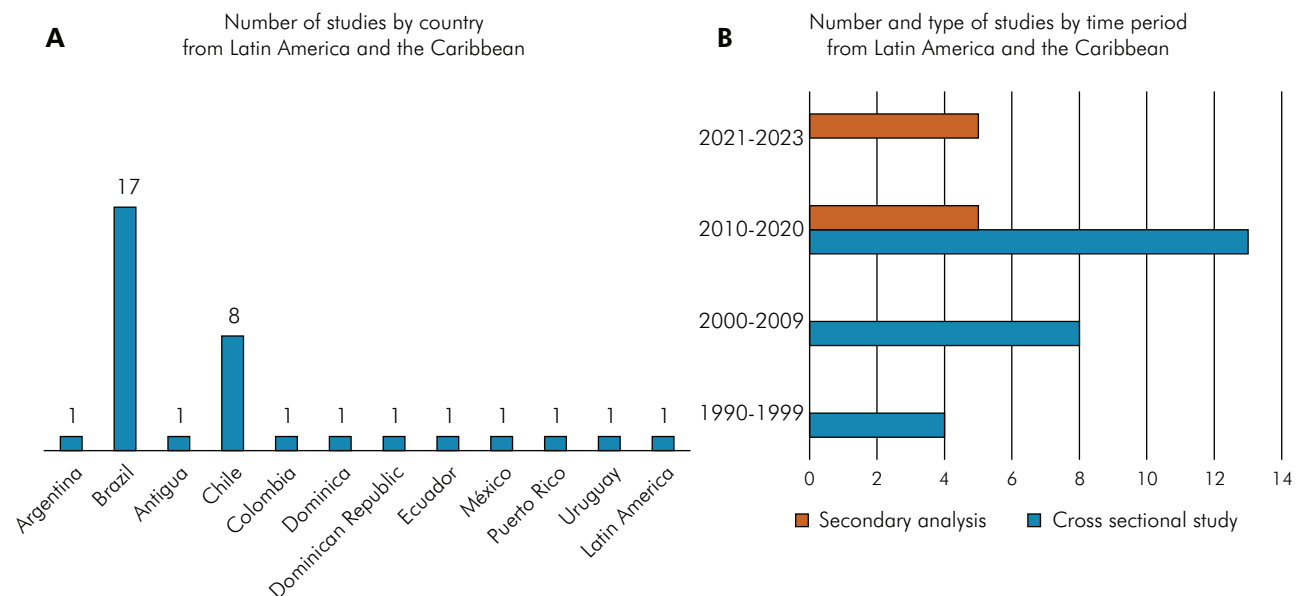


Figure 2. Number of studies by country (a) and by time period and type of studies (b) from Latin America and the Caribbean, found in the search strategy included in the review.

Periodontitis prevalence in the adult population

For adults, studies analyzing the periodontitis prevalence were reported in six countries (Table 2): Argentina,¹⁸ Brazil,^{14,15,20-24,26-28,44,45} Chile,^{13,19,29,46,47} Colombia,²⁵ México,¹⁷ and Uruguay.¹⁶

Different results were obtained in these studies depending on the age group analyzed and the case definition used. In fact, when periodontitis was defined as having at least one periodontal site with PD > 3 mm or CPI > 2, periodontitis prevalence varied between 11.6% and 99.9%. In

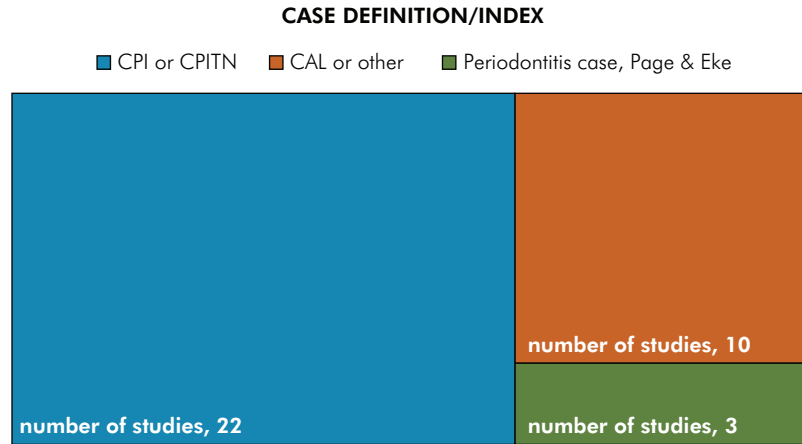


Figure 3. Number of studies according to case definition or index used as periodontal criteria.

contrast, when periodontitis was defined as having at least one periodontal site with $CAL \geq 5$ mm, Susin et al.⁴⁵ reported in young adults from Porto Alegre, Brazil, a periodontitis prevalence of 17.2% in ages 20–24 years-old and 29.0% in 25–29 years-old was reported. For adults aged ≥ 60 years-old from Porto Alegre, Gaio et al.²¹ reported a periodontitis prevalence of 94.1%. In the same country, for adults in Cajaíba, Corraini et al.⁴⁴ reported a periodontitis prevalence of 37.1% in the 20–29 years-old group, which increased to 70.0%, 83.3%, and 100% in the age groups 30–39, 40–49, and ≥ 50 years-old, respectively. With the same case definition, Gamonal et al.¹⁹ reported a periodontitis prevalence of 58.3% and 81.4% in Chilean age groups 35–44 and 65–74 years-old, respectively. In these studies, the periodontitis prevalence was lower when a stricter case definition was used, for instance, more than one tooth with CAL or the combination of PD and CAL. Indeed, periodontitis prevalence varied between 14.5% and 72.0% for moderate-to-severe periodontitis^{16,17,23,25,28,45} and between 5.8% and 49.7% for severe periodontitis.^{14,16,23} In general, all these studies reported a higher prevalence of periodontitis in men.

Gingivitis and periodontitis prevalence in the adolescent population

To report the prevalence of gingivitis and periodontitis in adolescents, studies were conducted in seven countries (Table 3): Antigua and Barbuda,³¹

Brazil,^{35,37,38,40,42,44,45} Chile,^{32,33,36,46} Dominica,³⁰ Ecuador,⁴³ Dominican Republic,³⁴ and Puerto Rico.⁴¹ In addition, a multicenter study was conducted, in which adolescents from Argentina, Chile, Colombia, Ecuador, and Uruguay were analyzed.³⁹

In the case of periodontitis, when the case definition involved the CPI, a prevalence not exceeding 16.3% was observed (adolescents with at least one periodontal site with $PD > 3$ mm or $CPI > 2$). In the multicenter study, a prevalence of 59.3% was reported. In contrast, when CAL was involved in the case definition, prevalences not exceeding 22.3% (adolescents with at least one periodontal site with $CAL \geq 3$ mm) and 7.7% (adolescents with at least a periodontal site with $CAL \geq 5$ mm) were observed. In the multicenter study, a prevalence of 32.6% for cases with $CAL \geq 3$ mm was reported. Conversely, a lower prevalence was observed when a stricter case definition was used. Indeed, Susin et al.⁴⁵ reported a prevalence of 18.2% (adolescents with more than one tooth with $CAL \geq 3$ mm), and Morales et al.⁴⁷ reported a prevalence of 15.3% (adolescents with detectable interdental CAL in at least two non-adjacent teeth), with 8.1% of individuals classified as stage III or IV periodontitis (adolescents with at least two non-adjacent teeth with interdental $CAL \geq 5$ mm).

In the case of gingivitis, a high prevalence was reported when the gingivitis case was established as the detection of gingival bleeding and at least

Table 2. Description of included studies for periodontal disease in adults.

Authors (year)	Country, City	Inclusion criteria	Exclusion criteria	Type of studied	Sample size (n)	Periodontal examination protocol	Age interval (years)	Periodontal criteria	Prevalence (CI) (%)	Prevalence by sex (%) female/male
Gamonal et al. (1998) ¹³	Chile, Santiago	Adults, 35–44 and 65–74 year-old	NR	Cross sectional, randomly	868 adults and 217 adult seniors	Ten index teeth, CPITN index, WHO probe	35–44 65–74	CPITN = 3 CPITN = 4 CPITN = 3 CPITN = 4	50.2 40.6 28.5 71.4	NR
Susin et al. (2004) ¹⁴	Brazil, Porto Alegre	Adults, 30 years and older	Edentulous and participant diagnosed with psychiatric problems or intoxicated with alcohol or drugs	Cross sectional, randomly	853	Six sites per tooth in full- mouth, PCP10-SE periodontal probe	30–103	Cases were defined as individuals with $\geq 30\%$ teeth with CAL ≥ 5 mm	49.7	40.5/54.9
Susin et al. (2005) ¹⁵	Brazil, Porto Alegre	Adults, 30 years and older	Edentulous, individuals diagnosed with serious psychiatric problems, or were intoxicated with alcohol or drugs	Cross sectional, randomly	853	Six sites per tooth in full- mouth, PCP10-SE periodontal probe	30–103	At least one tooth with PD: PD ≥ 4 mm PD ≥ 5 mm PD ≥ 6 mm PD ≥ 7 mm	79.6 65.2 35.3 25.4	72.2/87.8 55.6/75.9 27.6/43.8 20.3/31.0
Lorenzo et al. (2005) ¹⁶	Uruguay	Adults and elderly	Edentulous	NRS, Cross sectional, First National Survey of Oral Health 2010-2011	adults = 358 and elderly 411	Six index teeth, CPI index, WHO probe	35–44 and 65–74	Periodontal disease was defined as: Moderate to severe when CPI > 2 and CAL ≥ 4 mm Severe when CPI > 2 and CAL ≥ 6	21.8 9.1	12.9/30.1 6.5/1.7
Borges-Yáñez et al. (2006) ¹⁷	México, three different populations in Central Mexico	Adults, 60 years and older of urban areas of middle and low income level, and a rural area	Edentulous	Cross sectional, randomly	365	Two sites per tooth in partial-mouth, Michigan periodontal probe	60 and older	At least two sites with CAL 4 mm or more	50.7	NR
Romanelli et al. (2007) ¹⁸	Argentina	Adults, 18–84 years of age, who spontaneously attended general dental services, with at least two teeth in any sextant	Patients with risk of endocarditis, diabetes or i immunologic disease, and patients receiving corticoids or i immunosuppressor drugs	Cross sectional	3,694	Six sites per tooth in full- mouth, CPI index, WHO periodontal controlled pressure probe, Sensor Probe Type C	18–84	CPI = 1 CPI = 2 CPI = 3 CPI = 4	17.2 38.8 26.4 14.3	NR

Continue

Continuation

At least one site with CAL or PD by age:									
Corraini et al. (2008) ⁴⁴	Brazil, microarea Cajalba	Adolescents and adults, ≥ 12 year-old	Edentulous	Cross sectional, census	194	Six sites per tooth in full- mouth, PCP-UNC-15, periodontal probe	12–82	20–29	37.1
								CAL ≥ 5 mm	8.1
								CAL ≥ 7 mm	30.1
								PD ≥ 5 mm	4.8
								PD ≥ 7 mm	
								30–39	70.0
								CAL ≥ 5 mm	20.0
								CAL ≥ 7 mm	37.5
								PD ≥ 5 mm	10.0
								PD ≥ 7 mm	
Gamonal et al. (2010) ¹⁹	Chile	Adults, urban, aged 35 to 44 year-old and adult seniors aged 65–74 year-old	Edentulous	Cross sectional, randomly	1,092 adults and 469 adult seniors	Six sites per tooth in full- mouth, PCP-UNC-15, periodontal probe	35–44	40–49	83.3
								CAL ≥ 5 mm	66.7
								CAL ≥ 7 mm	70.8
								PD ≥ 5 mm	29.2
								PD ≥ 7 mm	
								≥ 50	100
								CAL ≥ 5 mm	83.3
								CAL ≥ 7 mm	60.0
								PD ≥ 5 mm	20.0
								PD ≥ 7 mm	
Frias et al. (2011) ²⁰	Brazil, Guarulhos	Adults, 35–44 year-old	NR	Cross sectional, randomly	263	Six sites per tooth in full- mouth, PCP10-SE periodontal probe	65–74	At least one site with CAL:	92.3/94.9, 93.4
								CAL > 3 mm	77.5
								CAL > 4 mm	58.3
								CAL > 5 mm	38.6
								CAL > 6 mm	
								At least one site with CAL:	97.3/98.0, 97.5
								CAL > 3 mm	92.7
								CAL > 4 mm	81.4
								CAL > 5 mm	76.7/88.2, 62.6/79.1
								CAL > 6 mm	69.3
Susin et al. (2011) ⁴⁵	Brazil, Porto Alegre	Adolescents and young adults, 14–29 year-old	Subjects with serious neurologic or psychiatric conditions were excluded and Aggressive periodontitis cases	Secondary study from a larger sample representative of the population of Porto Alegre	584 (174, 20–24 year-old and 154, 25–29 year-old)	Six sites per tooth in full- mouth, PCP10-SE periodontal probe	20–24	CPI = 0	10.6 (7.3–14.8)
								CPI = 1	9.1 (6.1–13.1)
								CPI = 2	53.6 (47.6–59.9)
								CPI = 3	22.4 (17.7–27.8)
								CPI = 4	4.2 (2.2–7.2)
								At least one site with CAL:	53.4 (43.0–63.8)
								CAL ≥ 3 mm	35.4 (24.2–46.6)
								CAL ≥ 4 mm	17.2 (9.5–25.0)
								CAL ≥ 5 mm	9.5 (3.3–15.8)
								CAL ≥ 6 mm	
Chronic periodontitis was defined as CAL ≥ 3 mm affecting two or more teeth.									NR

Continue

Continue

Continuation

Arantes et al. (2021) ²⁶	Brazil, Central-West	Adults, 35–44 year-old non-Indigenous	NR	NRS. Secondary study from Brazilian Oral Health Survey 2010	1,83	Six index teeth, CPI index and CAL, WHO probe	35–44	CPI = 2 CPI = 3 + CPI = 4	43.9 (37.4–50.7) 30.5 (28.2–32.9)	NR
Hugo et al. (2022) ²⁷	Brazil	NR	NR	Secondary study from Global Burden Disease 2019	NR	NR	NR	CPTN = 4 or CAL > 6 mm or PD > 5 mm	11.9 (8.6–15.4)	NR
Morales et al. (2022) ⁴⁷	Chile	Adults, urban, aged 35–44 and 65–74 year-old	Edentulous	NRS. Secondary study from First Chilean National Examination Survey 2007–2008	1,456 adults	Six sites per tooth in full- mouth, PCP-UNC-15, periodontal probe	35–44 and 65–74	CDC-AAP (2012) case definition Mild Moderate Severe AAP/EPP (2018) stage of periodontitis	1.4 57.2 29.7	NR
Filgueiras et al. (2023) ²⁸	Brazil	Adults users of public services, 35–44 year-old	Edentulous and insufficient dental sextants for CAL examination	NRS. Secondary study from Brazilian Oral Health Survey 2010	3,426	Six index teeth, CPI index and CAL, WHO probe	35–44	At least two sites with CAL > 3 mm, and at least one site with PD > 3 mm, not necessarily at the same site	0.1 4.7 12.8 81.3 14.5	NR
León et al. (2023) ²⁹	Chile	Elderly, 65 years and older	NR	Secondary study from Global Burden Disease 2019	NR	NR	65–69 70–74 75–79 80–84 85–89 90–94 > 94	CPI = 4 (probing score > 5.5 mm)	29.1 (22.0–37.5) 26.8 (20.2–34.9) 25.4 (19.2–32.1) 24.4 (18.1–30.7) 23.8 (16.9–30.3) 23.2 (15.9–30.0) 22.7 (14.7–30.8)	NR

CPTN: community periodontal index treatment needs; CAL: clinical attachment loss; PD: probing deep; CPI: community periodontal index; NRS: National representative study; NR: Not reported data.

Table 3. Description of included studies for periodontal disease in adolescents.

Authors (year)	Country, City	Inclusion criteria	Exclusion criteria	Type of studied	Sample size (n)	Periodontal examination protocol	Age interval (years)	Periodontal criteria	Prevalence (CI) (%)	Prevalence by sex (%) female/male
Leake et al. (1990) ³⁰	Dominica	Children, 12 year-old, attending school	NR	Cross sectional, randomly	332	Six index teeth, CPITN index, WHO probe	12	CPITN = 0 CPITN = 1 + CPITN = 2	17 62	NR
Vignarajah (1994) ³¹	Caribbean Island Antigua y Barbuda	Children and adolescents, attending urban and rural schools, 12, 15–19 year-old	NR	Cross sectional, randomly	246, and 456	Six index teeth, CPITN index, WHO probe	12 15–19	CPITN = 0 CPITN = 1 CPITN = 2 CPITN = 0 CPITN = 1 CPITN = 2 CPITN = 3 CPITN = 4 CPITN = 0 CPITN = 1 CPITN = 2 CPITN = 3 CPITN = 4	26.0 28.0 43.0 14.0 13.0 56.0 14.0 3.0 5.4 14.8 62.2 9.5 0.9	NR
Lopez et al. (1996) ³²	Chile, Santiago	Adolescents, 15–19 year-old attending high school		Cross sectional, randomly	2,4	Six index teeth, CPITN index, WHO probe	15–19	CPITN = 0 CPITN = 1 CPITN = 2 CPITN = 3 CPITN = 4		NR
Lopez et al. (2001) ³³	Chile, Province Santiago	Adolescents, 12–21 year-old attending high school	Not be examined due to constraints such a trismus	Cross sectional, randomly	9,162	Six sites of first and second molars and incisors	12–14 15–17 18–21	At least one site with CAL ≥ 3 mm	2.5 3.7 6.8	2.2/2.9 4.7/2.8 5.2/7.9
Collins et al. (2005) ³⁴	Dominican Republic, Santo Domingo	Adolescents, 12–21 year-old attending high school	No CAL detected	Cross sectional, randomly	1,963	Six sites of first and second molars and incisors	12–21	At least one site with CAL ≥ 1 mm CAL ≥ 2 mm CAL ≥ 3 mm	49.5 15.0 4.0	49.3/49.6 15.1/14.9 4.2/3.7
Corraini et al. (2008) ⁴⁴	Brazil, microarea Cajaliba	Adolescents and adults, ≥ 12 year-old	Edentulous	Cross sectional, census	194	Six sites per tooth in full-mouth, PCP-UNC-15, periodontal probe	12–82	At least one site with CAL or PD by age: 12–19 CAL ≥ 5 mm CAL ≥ 7 mm PD ≥ 5 mm PD ≥ 7 mm	7.7 5.1 5.1 5.1	NR
Antunes et al. (2008) ³⁵	Brazil, Sao Paulo	Adolescents, 15–19 year-old	Asian and Amerindian categories	Cross sectional, randomly	1,799	Six index teeth, CPI index, WHO probe	15–19	CPI = 0 CPI = 1 CPI = 2	65.7 (63.5–67.9) 21.6 (19.7–23.6) 19.4 (17.6–21.3)	NR 19.5/24.5 17.4/22.1
Susin et al. (2011) ⁴⁵	Brazil, Porto Alegre	Adolescents and young adults, 14–29 year-old	Subjects with serious neurologic or psychiatric conditions were excluded and Aggressive periodontitis cases	Secondary study from a larger sample representative of the population of Porto Alegre	584 (256 14–19 year-old)	Six sites per tooth in full-mouth, PCP10-SE periodontal probe	14–19	At least one site with CAL: CAL ≥ 3 mm CAL ≥ 4 mm CAL ≥ 5 mm CAL ≥ 6 mm Chronic periodontitis was defined as CAL ≥ 3 mm affecting two or more teeth.	22.3 (12.2–32.5) 7.4 (2.0–12.8) 2.5 (0.4–4.6) 18.2 (7.9–28.4)	NR NR NR NR NR

Continue

Continuation

Wauters et al. (2014) ³⁶	Chile, Castro	Children aged 12 year-old attending urban, public and private-subsidized schools	Students with fixed orthodontics appliances and/or a pathology, such as Down syndrome, trismus and epilepsy	Cross sectional, randomly	242	Six index teeth, CPITN index, WHO probe	12	CPITN = 0 CPITN = 1 CPITN = 2 CPITN = 3	0.0 42.2 44.2 13.6	0.0/0.0 45.0/38.9 42.6/46.0 12.4/15.0
Leão et al. (2015) ³⁷	Brazil, Caiuá, São Paulo State	Adolescents, 10–19 year-old, rural school	Refused study participation	Cross sectional, census	180	Six index teeth, CPI index, WHO probe	10–19	CPI = 1 CPI = 2 CPI = 3	77.7 20.8 1.5	NR
Fonseca (2015) ³⁸	Brazil, Vale do Jequitinhonha	Adolescents, 15–19 year-old	Individuals with difficulties cognitive or mentalis	Cross sectional, randomly	450	CPI index with some modifications	15–19	CPI = 0 CPI = 1 CPI = 2	3.5 51.5 8.4	3.3/3.8 57.8/44.2 6.6/10.5
Morales et al. (2015) ³⁹	Latin America, Capital cities from countries in South America, Argentina, Chile, Colombia, Ecuador and Uruguay	Adolescents, 15–19 year-old attending public and private high school	Subjects undergoing fixed orthodontic treatments or with any condition that required antibiotic prior to the periodontal examination	Cross sectional, randomly, multicenter	1,07	Six sites per tooth in full- mouth, PCP-UNC-15, periodontal probe	15–19	At least one site with CAL or PD: CAL ≥ 3 mm PD ≥ 4 mm BoP ≥ 25%	32.6 59.3 28.6	35.8/29.1 58.9/59.6 34.1/22.7
Tomazoni et al. (2016) ⁴⁰	Brazil, Santa Maria	Children aged 12 year-old attending public schools	NR	Cross sectional, randomly	1,134	Six index teeth, CPI index, WHO probe	12	Gingivitis was considered if: At least one surface showed CPI = 1 Using a cut-off point of > 15% bleeding	96.2 (95.1–97.3) 26.2 (23.7–28.8)	NR
Giacaman et al. (2016) ⁴⁶	Chile, Maule region	Population from Maule region urban and rural, 15, 35–44 and 65–74 year-old	NR	Cross sectional, randomly	2,414	Six index teeth, CPI index, WHO probe	15	CPI = 1 CPI = 2 CPI = 3 CPI = 4	8.7 74.4 16.3 0.0	11.0/6.8 71.1/77.0 17.0/15.8 0.0/0.0
Elias-Boneta et al. (2018) ⁴¹	Puerto Rico	Children, 12 year-old, attending public and private schools, physical status ASA I and ASA II	Participants with conditions requiring antibiotic prophylaxis	Cross sectional, randomly	1,586	Gentle probing into gingival sulcus of the buccal surface, PCP UNC 126 periodontal probe	12	At least one site presented gingival bleeding. Gingivitis limited: 2–4 teeth or 25%–49% of the teeth examined presented gingival bleeding Extensive gingivitis: > 5 teeth or > 50% of the teeth examined presented gingival bleeding	80.4 19.5 60.8	79.5/81.2 18.7/20.4 60.8/60.8
									Continue	

Continuation									
Knack et al. (2019) ⁴²	Brazil	Adolescents, 12, 15–19 year-old	NR	NRS. Secondary study from 12-year-old and old and Health Survey 2010	12,773 (7,328)	Six index teeth, CPI index and CAL, WHO probe	12, 15–19	CPI = 1 CPI = 2 CPI = 3 CPI = 4	32.0 33.1 4.5 0.3 31.8/32.2 31.6/34.6 NR NR
Michel-Crosato et al. (2019) ⁴³	Ecuador, Quito	Children aged 12 year-old attending public and urban schools	NR	Cross sectional, randomly	1,1	Six index teeth, CPITN index, WHO probe	12	CPITN = 1	92.0 NR
Morales et al. (2022) ⁴⁷	Capital cities from countries in South America, Argentina, Chile, Colombia, Ecuador and Uruguay	Adolescents from South America, attending schools, 15–19 year-old	Edentulous	Secondary study from a sample of adolescents from different countries in South America 2010-2012	1,07	Six sites per tooth in full- mouth, PCP-UNC-15, periodontal probe	15–19	CDC-AAP (2012) case definition Mild Moderate Severe AAP/EPP (2018) stage of periodontitis Stage I Stage II Stage III Stage IV	11.4 15.3 0.5 39.3 28.2 7.6 0.5 NR

CPITN: community periodontal index treatment needs; CAL: clinical attachment loss; PD: probing deep; CPI: community periodontal index; BoP: bleeding on probing; NRS: national representative study; NR: not reported data.

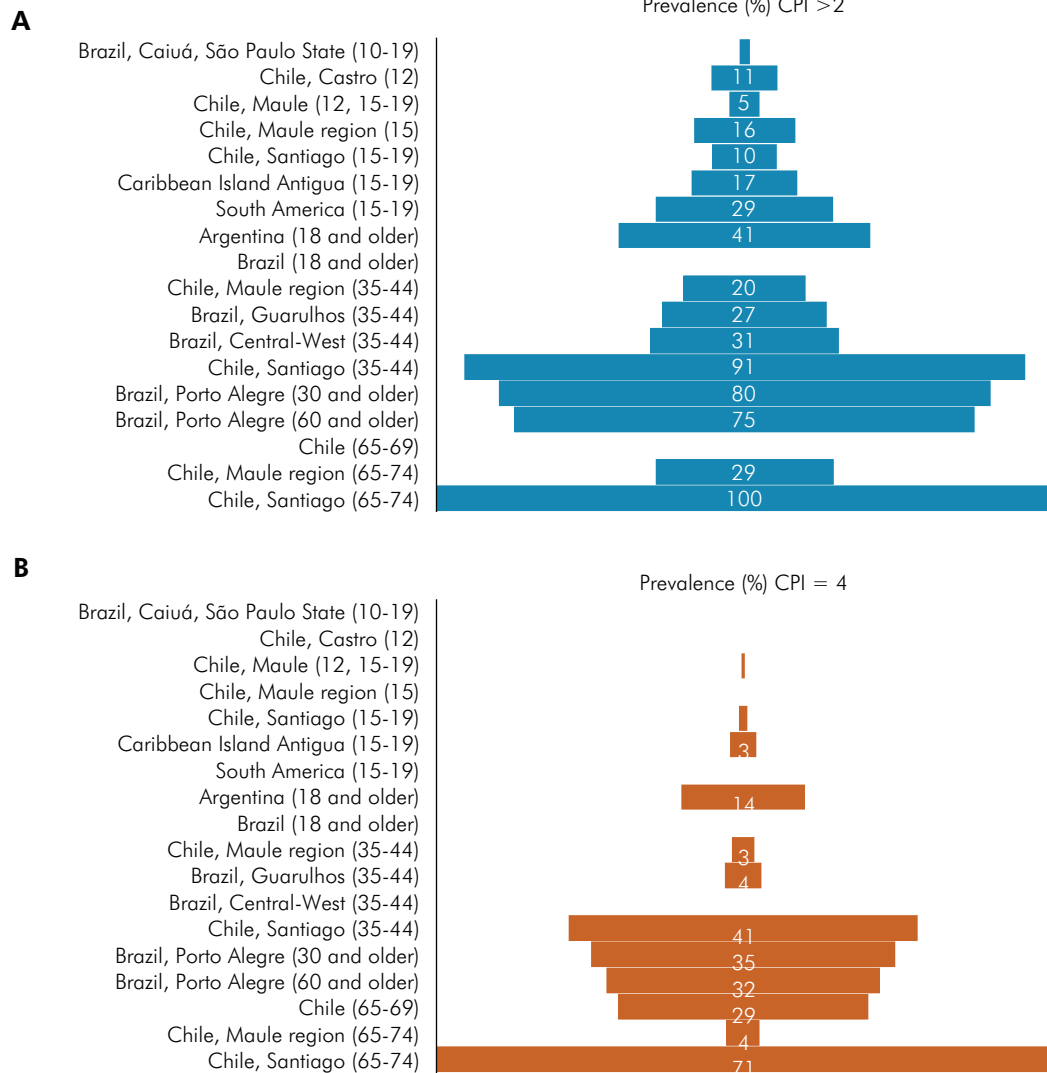


Figure 4. Studies categorized according to prevalence (%) using CPI index criteria, (a) CPI > 2 and (b) CPI = 4, ordered by age.

one local factor (such as dental calculus) in at least one periodontal site (CPI = 1 or CPI = 2). In particular, the gingivitis prevalence values were 28% in Antigua y Barbuda, 62% in Dominica, 80.4% in Puerto Rico, and 92% in Ecuador^{30,31,41,43}. In Chile, the prevalence of gingivitis ranged between 8.7% and 42.2% in the different cities studied.^{32,36,46} In Brazil, the gingivitis prevalence ranged between 21.6% and 96.2% in the cities studied,^{35,37,38,40} in a national study conducted with 12 year-old adolescents and those between 15-19 years old, a prevalence of 33.1%.⁴² was reported

Results reanalysis using CPI as the case definition

To perform a comprehensive analysis of the findings summarized herein, the data from 18 studies (51%) from 4 countries and the multicenter study in adolescents were re-categorized as CPI > 2 and CPI = 4. Then, periodontal disease prevalences were ordered according to age (Figure 4). Two studies did not provide data to establish the category CPI > 2,^{27,29} and two other studies for CPI = 4.^{26,39} The data reanalysis revealed that for adolescents, the prevalence of periodontal disease with CPI > 2 ranged

between 2% to 29%, and with CPI = 4 did not exceed 3%. However, prevalence increased considerably with age, reaching 99.9% in the most affected population (65–74 years-old, in Chile), with 71.4% of individuals being classified as CPI = 4.

Comprehensive analysis of the studies that used the Page y Eke recommended case definition

Figure 5 shows the prevalence of periodontitis in the four studies that used the case definition recommended by Page and Eke¹². In the multicenter study with adolescents, a prevalence of 27.2% of periodontitis was reported, with 0.5% of subjects having severe periodontitis.⁴⁷ In Pelotas, Brazil, subjects at the age of 31 years showed a prevalence of moderate-to-severe periodontitis of 37.3% and a prevalence of severe periodontitis of 14.3% was reported.²⁴ Then, in the national study carried out in Colombia, in the age range of 18 to 79 years old the periodontitis prevalence was 61.5%, with 10.6% of subjects having severe periodontitis.²⁵ Finally, in the national study conducted in Chile,, for subjects aged between 35–44 and 65–74 years old,, the prevalence of periodontitis was 88.3%, with

29.7% of subjects having severe periodontitis.⁴⁷ To sum up these results confirmed that with increasing age, the prevalence of periodontitis also increases.

Discussion

In the present study, an updated review of the epidemiological studies that have analyzed the prevalence of periodontal disease in adolescents and adults living in Latin America and the Caribbean was carried out. According to our findings, the situation described by Botero and Oppermann in 2015^{6,7} was maintained at the end of 2023. Although the number of regional or nationally representative studies has increased, the methods used and the case definition were found to be heterogeneous. Furthermore, the evidence available was insufficient to describe the region globally. Indeed, most countries have no nationally representative epidemiological studies; when they did have, the majority of them were approximately 30 years old. Nevertheless, we could conclude that periodontal disease significantly affected the vast majority of the populations analyzed, and its prevalence increased significantly with age, showing

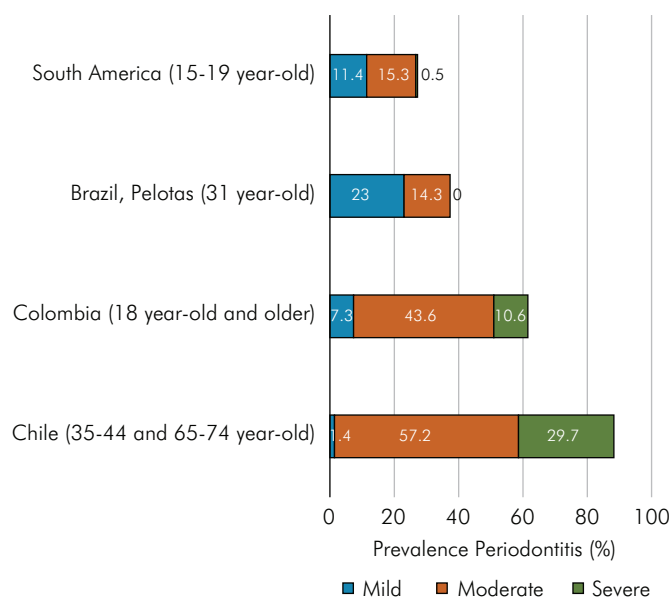


Figure 5. Stacked bar charts showing the prevalence of periodontitis in adolescents or adults according to the studies in Latin-American that used CDC/AAP case definition.

a prevalence ranging between 15.3% to 59.3% in adolescents and 11.6% to 99.9% in adults.

Nationally representative studies of the adult population have been conducted in Brazil, Colombia, Chile, and Uruguay. In the studies from Brazil and Uruguay, a prevalence values of 5.8% and 9.1% severe periodontitis were reported in 35–44 year old adults, when the case definition used involved the CPI index and the CAL with partial mouth registration. Similarly, in the study from Colombia, a prevalence of severe periodontitis of 10.6% was reported at the age of 18–79 years, using the case definition proposed by Page and Eke with full-mouth registration. However, in Chile, a higher prevalence of severe periodontitis was reported, reaching 29.7% at the combined age group of 35–44 and 65–74 years old, also using the Page and Eke proposal of case definition with full-mouth registration. Therefore it was evident that the different prevalence values of severe periodontitis reported among these countries were, at least partly, due to the different ages of the individuals analyzed and the various methods of periodontal evaluation. Moreover, it is noteworthy that multiple social determinants were identified, including income, which have a meaningful impact on the increase in the prevalence of periodontal diseases.^{49,50} Indeed, as previously established, partial records may underestimate the prevalence of periodontitis.⁵¹ Furthermore, it was also evident that the variability of results were due to the heterogeneous definition of the periodontal case.

A criterion widely used to define severe periodontitis is PD > 6 mm, given its relevance in public health and because it contributes to determining the need for periodontal treatment. Recently, this case definition was used in the Global Burden of Disease study conducted by Wu et al.,⁴ and a prevalence of severe periodontitis in adults of around 19% was reported for the America continent. In the present review, when the articles using the case definition of PD > 6 mm or a CPI = 4 were analyzed, a prevalence between 14% and 71% was observed, depending on the age of the Latin American adults analyzed. This higher prevalence of severe periodontitis in Latin America could be related to a greater frequency of social determinants

that contribute to the burden of chronic non-communicable diseases, such as periodontitis, and include low socioeconomic and education levels and high prevalence of risk factors. Particularly in Chile, the prevalence of smoking and type II diabetes mellitus is higher than that of other Latin American countries, and it could contribute to its higher prevalence of severe periodontitis.⁵²⁻⁵⁵

Concerning the current classification of periodontal and peri-implant diseases and conditions proposed by the AAP/EFP, it should be considered with caution when used in studies to describe the prevalence of periodontitis. In the study by Morales et al., two primary studies were re-analyzed, and the individuals were re-classified considering the case definition proposed by Page and Eke¹² and the current AAP/EFP classification.⁴⁸ In the first case, the prevalence of severe periodontitis was 0.5% in adolescents and 29.7% in adults. Conversely, in the second case, the prevalence was much higher, reporting that 8.1% of adolescents and 94.1% of adults had stage III and IV periodontitis. Therefore, as has been established elsewhere, the classification proposed by the AAP/EFP is not recommended for use in epidemiological studies since it tends to overestimate the prevalence of periodontitis and, consequently, the need for periodontal treatment.^{56,57}

When the studies conducted in different Latin America and the Caribbean countries were comprehensively analyzed, a high prevalence of gingivitis in adolescents was revealed. Therefore, a challenge was generated to identify and resolve this disease early and stop its progression to periodontitis. In the same way, although with less evidence, a high prevalence of periodontitis was revealed in adults, which could lead to severe forms of the disease that can compromise the general health and quality of life of individuals. One of the limitations of the present review was that a search of the gray literature was not carried out, nor were databases from universities and ministries of health analyzed. Thus, different studies on the prevalence of gingivitis or periodontitis in the region that could have been helpful for our analysis were not considered. Nevertheless, one of the strengths of our study was the systematization of all the literature published in the traditional

databases to means of a broad search without language and time restrictions. This allowed an update of the knowledge as from December 2023 and complemented with the articles that were reported for the region until 2015.^{6,7} Although few articles met the inclusion criteria established in this review, they informed us about active Latin American and Caribbean countries at the level of university campuses with studies in specific populations that provided relevant information, which undoubtedly contributed to local decision-making on health issues. Indeed together, these studies showed that the prevalence of periodontal disease increases with the age of the population, which is a critical determinant that must be considered when defining public policies on periodontal health. This is particularly relevant when, in recent years, an accelerated aging process has been evident in Latin America and the Caribbean.^{8,58} Moreover, emerging evidence establishes that chronological aging and premature periodontal immunosenescence contribute to the pathogenesis of periodontitis.^{59,60}

In this context, the efforts of various professional and scientific organizations and societies are notable, which have handled their resources to reveal periodontal health problems worldwide, including the Global Report of the WHO, the World Dental Federation (FDI), the International Association for Dental Research (IADR), the European Organization for Caries Research/European Federation of Periodontology (ORCA/EFP) Consensus, and the Latin American Oral Health Association (LAOHA) Consensus.⁶¹ Based on the findings herein, we recommend generating alliances and international consensus to adequately monitor gingivitis and periodontitis in the region. In particular, it is essential to agree on the definition

of the periodontal case, standardized measurement criteria, establish homogenous evaluation methods, and age groups to analyze, as priorities for future epidemiological studies. In the last consensus convened by the LAOHA in 2015,⁶¹ the need to implement actions to promote prevention, professional education programs, early diagnosis, and timely treatment of periodontitis was identified. At this moment, we recommend designing and implementing multicenter studies with national representation in which a unique case definition is assessed, such as the CPI index or that proposed by Page and Eke. In this way, more significant information about the need for treatment (scaling and root plan) and estimation of the resources needed to address epidemiological studies would be obtained.^{11,12,62} Indeed, in such a way this needs to be done in such a way that it generates reliable, reproducible, and comparable data. The goal is to facilitate the organization and systematization of information to foster the generation of public policies, preventive plans, and early diagnosis and treatment strategies that allow us to resolve the serious periodontal reality in Latin America and the Caribbean.

Acknowledgments

This manuscript was prepared for the consensus titled “Latin America and Caribbean Periodontics Consensus 2024” organized by the Latin American Oral Health Association (LAOHA). The consensus process actively engaged experts from across the region, and the broader community was invited to review and contribute to the content. The resulting Consensus Report was derived from this paper. We would like to acknowledge the Colgate Palmolive Company for their support.

References

1. Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: A call for global action. *J Clin Periodontol*. 2017 May;44(5):456-62. <https://doi.org/10.1111/jcpe.12732>
2. Peres MA, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. *Lancet*. 2019 Jul;394(10194):249-60. [https://doi.org/10.1016/S0140-6736\(19\)31146-8](https://doi.org/10.1016/S0140-6736(19)31146-8)
3. Kassebaum NJ, Smith AG, Bernabé E, Fleming TD, Reynolds AE, Vos T, et al. Incidence, and disability-adjusted life years for oral conditions for 195 countries, 1990-2015: a systematic analysis for the global burden of diseases, injuries, and risk factors. *J Dent Res*. 2017 Apr;96(4):380-7. <https://doi.org/10.1177/0022034517693566>

4. Wu L, Zhang SQ, Zhao L, Ren ZH, Hu CY. Global, regional, and national burden of periodontitis from 1990 to 2019: results from the Global Burden of Disease study 2019. *J Periodontol*. 2022 Oct;93(10):1445-54. <https://doi.org/10.1002/JPER.21-0469>
5. Trindade D, Carvalho R, Machado V, Chambrone L, Mendes JJ, Botelho J. Prevalence of periodontitis in dentate people between 2011 and 2020: a systematic review and meta-analysis of epidemiological studies. *J Clin Periodontol*. 2023 May;50(5):604-26. <https://doi.org/10.1111/jcpe.13769>
6. Botero JE, Rösing CK, Duque A, Jaramillo A, Contreras A. Periodontal disease in children and adolescents of Latin America. *Periodontol* 2000. 2015 Feb;67(1):34-57. <https://doi.org/10.1111/prd.12072>
7. Oppermann RV, Haas AN, Rösing CK, Susin C. Epidemiology of periodontal diseases in adults from Latin America. *Periodontol* 2000. 2015 Feb;67(1):13-33. <https://doi.org/10.1111/prd.12061>
8. León S, De Marchi RJ, Tôrres LH, Hugo FN, Espinoza I, Giacaman RA. Oral health of the Latin American elders: what we know and what we should do-Position paper of the Latin American Oral Geriatric Group of the International Association for Dental Research. *Gerodontology*. 2018 Jun;35(2):71-7. <https://doi.org/10.1111/ger.12318>
9. Carvajal P, Vernal R, Reinero D, Malheiros Z, Stewart B, Pannuti CM, et al. Periodontal disease and its impact on general health in Latin America. Section II: Introduction part II. *Braz Oral Res*. 2020;34(suppl 1):e023. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0023>
10. Petersen PE, Baez RJ. Oral health surveys: basic methods. 5th ed. Geneva: World Health Organization; 2013.
11. Page RC, Eke PI. Case definitions for use in population-based surveillance of periodontitis. *J Periodontol*. 2007 Jul;78(7 Suppl):1387-99. <https://doi.org/10.1902/jop.2007.060264>
12. Eke PI, Page RC, Wei L, Thornton-Evans G, Genco RJ. Update of the case definitions for population-based surveillance of periodontitis. *J Periodontol*. 2012 Dec;83(12):1449-54. <https://doi.org/10.1902/jop.2012.110664>
13. Gamonal JA, Lopez NJ, Aranda W. Periodontal conditions and treatment needs, by CPITN, in the 35-44 and 65-74 year-old population in Santiago, Chile. *Int Dent J*. 1998 Apr;48(2):96-103. <https://doi.org/10.1111/j.1875-595X.1998.tb00467.x>
14. Susin C, Oppermann RV, Haugejorden O, Albandar JM. Periodontal attachment loss attributable to cigarette smoking in an urban Brazilian population. *J Clin Periodontol*. 2004 Nov;31(11):951-8. <https://doi.org/10.1111/j.1600-051x.2004.00588.x>
15. Susin C, Valle P, Oppermann RV, Haugejorden O, Albandar JM. Occurrence and risk indicators of increased probing depth in an adult Brazilian population. *J Clin Periodontol*. 2005 Feb;32(2):123-9. <https://doi.org/10.1111/j.1600-051x.2005.00637.x>
16. Lorenzo SM, Alvarez R, Andrade E, Piccardo V, Francia A, Massa F, et al. Periodontal conditions and associated factors among adults and the elderly: findings from the first National Oral Health Survey in Uruguay. *Cad Saude Publica*. 2015 Nov;31(11):2425-36. <https://doi.org/10.1590/0102-311X00012115>
17. Borges-Yáñez SA, Irigoyen-Camacho ME, Maupomé G. Risk factors and prevalence of periodontitis in community-dwelling elders in Mexico. *J Clin Periodontol*. 2006 Mar;33(3):184-94. <https://doi.org/10.1111/j.1600-051x.2006.00897.x>
18. Romanelli H, Gonzalez y Rivas M, Chiappe V, Gómez M, Macchi R. Periodontal treatment needs in Argentine adult subjects. *Acta Odontol Latinoam*. 2007;20(1):39-47.
19. Gamonal J, Mendoza C, Espinoza I, Muñoz A, Urzúa I, Aranda W, et al. Clinical attachment loss in Chilean adult population: first Chilean national dental examination survey. *J Periodontol*. 2010 Oct;81(10):1403-10. <https://doi.org/10.1902/jop.2010.100148>
20. Frias AC, Antunes JL, Frattucci MV, Zilbovicius C, Junqueira SR, Souza SF, et al. [Population based study on periodontal conditions and socioeconomic determinants in adults in the city of Guarulhos (SP), Brazil, 2006]. *Rev Bras Epidemiol*. 2011 Sep;14(3):495-507. Portuguese. <https://doi.org/10.1590/S1415-790X2011000300014>
21. Gaio EJ, Haas AN, Carrard VC, Oppermann RV, Albandar J, Susin C. Oral health status in elders from South Brazil: a population-based study. *Gerodontology*. 2012 Sep;29(3):214-23. <https://doi.org/10.1111/j.1741-2358.2011.00617.x>
22. Bonfim ML, Mattos FF, Ferreira EF, Campos AC, Vargas AM. Social determinants of health and periodontal disease in Brazilian adults: a cross-sectional study. *BMC Oral Health*. 2013 May;13(1):22. <https://doi.org/10.1186/1472-6831-13-22>
23. Vettore MV, Marques RAA., Peres MA [Social inequalities and periodontal disease: multilevel approach in SBBrazil 2010 survey]. *Rev Saude Publica*. 2013 Dec;47 Suppl 3:29-39. Portuguese. <https://doi.org/10.1590/S0034-8910.2013047004422>
24. Schuch HS, Peres KG, Demarco FF, Horta BL, Gigante DP, Peres MA, et al. Effect of life-course family income trajectories on periodontitis: birth cohort study. *J Clin Periodontol*. 2018 Apr;45(4):394-403. <https://doi.org/10.1111/jcpe.12845>
25. Serrano C, Suarez E. Prevalence of severe periodontitis in a Colombian adult population. *J Int Acad Periodontol*. 2019 Apr;21(2):53-62.
26. Arantes R, Jamieson LM, Frazão P. Dental caries, periodontal disease and restorative dental care among Indigenous and non-Indigenous groups in Brazil: A descriptive study. *Community Dent Oral Epidemiol*. 2021 Feb;49(1):63-9. <https://doi.org/10.1111/cdoe.12577>
27. Hugo FN, Bailey JA, Stein C, Cunha AR., Iser BP, Malta DC, et al. Prevalence, incidence, and years-lived with disability due to oral disorders in Brazil: an analysis of the Global Burden of Disease Study 2019. *Rev Soc Bras Med Trop*. 2022 Jan;55:e0284. <https://doi.org/10.1590/0037-8682-0284-2021>
28. Filgueiras LV, Cabreira FS, Pilotto LM, Celeste RK. Association between socioeconomic contextual factor, dental care service availability, and prevalence of periodontitis in Brazil: a multilevel analysis *Cad Saude Publica*. 2023 May;39:e00201522. <https://doi.org/10.1590/0102-311xen201522>

29. León S, Gambetta-Tessini K, Pinto M, Salvo F, Herrera J, Kassebaum N, et al. Oral disorders among older Chileans: prevalence, incidence, and years lived with disability. *Geriatrics, Gerontology and Aging*. 2023;17(0):1-9. <https://doi.org/10.53886/gga.e0230001>
30. Leake JL, Otchere DF, Davey KW, Bedford WR, McIntyre DO. The dental health of 12-year-old children in Dominica: a report of a survey using WHO methods. *J Can Dent Assoc*. 1990 Nov;56(11):1025-8.
31. Vignarajah S. Periodontal treatment needs in 12 and 15 to 19-year-old school children in the Caribbean Island of Antigua, 1990. *J Periodontal Res*. 1994 Sep;29(5):324-7. <https://doi.org/10.1111/j.1600-0765.1994.tb01229.x>
32. López NJ, Rios V, Fernandez O. Periodontal conditions in 15-19-year-old Chileans. *Int Dent J*. 1996 Jun;46(3):161-4.
33. López R, Fernández O, Jara G, Baelum V. Epidemiology of clinical attachment loss in adolescents. *J Periodontol*. 2001 Dec;72(12):1666-74. <https://doi.org/10.1902/jop.2001.72.12.1666>
34. Collins J, Carpio AM, Bobadilla M, Reyes R, Gúzman I, Martínez B, et al. Prevalence of clinical attachment loss in adolescents in Santo Domingo, Dominican Republic. *J Periodontol*. 2005 Sep;76(9):1450-4. <https://doi.org/10.1902/jop.2005.76.9.1450>
35. Antunes JL, Peres MA, Frias AC, Crosato EM, Biazevic MG. [Gingival health of adolescents and the utilization of dental services, state of São Paulo, Brazil]. *Rev Saude Publica*. 2008 Apr;42(2):191-9. <https://doi.org/10.1590/S0034-89102008000200002>
36. Wauters M, Hernández SE, Juárez I, Vergara G. Oral hygiene, periodontal status and treatment needs in 12 years old students, Castro-Chile, 2014. *J Oral Res*. 2014 Dec;4(1):19-24. <https://doi.org/10.17126/joralres.2015.006>
37. Leão MM, Garbin CA, Moimaz SA, Rovida TA. Oral health and quality of life: an epidemiological survey of adolescents from settlement in Pontal do Paranapanema/SP, Brazil. *Cien Saude Colet*. 2015 Nov;20(11):3365-74. <https://doi.org/10.1590/1413-812320152011.00632015>
38. Fonseca EP, Ferreira EF, Abreu MH, Palmier AC, Vargas AM. [The relationship between gingival condition and socio-demographic factors of adolescents living in a Brazilian region]. *Cien Saude Colet*. 2015 Nov;20(11):3375-84. Portuguese. <https://doi.org/10.1590/1413-812320152011.00142015>
39. Morales A, Carvajal P, Romanelli H, Gómez M, Loha C, Esper ME, et al. Prevalence and predictors for clinical attachment loss in adolescents in Latin America: cross-sectional study. *J Clin Periodontol*. 2015 Oct;42(10):900-7. <https://doi.org/10.1111/jcpe.12452>
40. Tomazoni F, Vettore MV, Zanatta FB, Tuchtenhagen S, Moreira CH, Ardenghi TM. The associations of socioeconomic status and social capital with gingival bleeding among schoolchildren. *J Public Health Dent*. 2017 Dec;77(1):21-9. <https://doi.org/10.1111/jphd.12166>
41. Elias-Boneta AR, Ramirez K, Rivas-Tumanyan S, Murillo M, Toro MJ. Prevalence of gingivitis and calculus in 12-year-old Puerto Ricans: a cross-sectional study. *BMC Oral Health*. 2018 Jan;18(1):13. <https://doi.org/10.1186/s12903-017-0471-5>
42. Knack KC, Sabadin CE, Boclin KL, Oltramari ES, Portilio MN, Rigo L. Periodontal conditions in adolescents and young Brazilians and associated factors: cross-sectional study with data from the Brazilian oral health survey, 2010. *J Indian Soc Periodontol*. 2019;23(5):475-83. https://doi.org/10.4103/jisp.jisp_753_18
43. Michel-Crosato E, Raggio DP, Coloma-Valverde AN, Lopez EF, Alvarez-Velasco PL, Medina MV, et al. Oral health of 12-year-old children in Quito, Ecuador: a population-based epidemiological survey. *BMC Oral Health*. 2019 Aug;19(1):184. <https://doi.org/10.1186/s12903-019-0863-9>
44. Corraini P, Baelum V, Pannuti CM, Pustiglioni AN, Romito GA, Pustiglioni FE. Periodontal attachment loss in an untreated isolated population of Brazil. *J Periodontol*. 2008 Apr;79(4):610-20. <https://doi.org/10.1902/jop.2008.070294>
45. Susin C, Haas AN, Valle PM, Oppermann RV, Albandar JM. Prevalence and risk indicators for chronic periodontitis in adolescents and young adults in south Brazil. *J Clin Periodontol*. 2011 Apr;38(4):326-33. <https://doi.org/10.1111/j.1600-051X.2011.01699.x>
46. Giacaman RA, Sandoval Salas D, Bustos Alvarez IP, Rojas Cáceres MA, Mariño RJ. Epidemiología del estado de salud periodontal en la VII Región del Maule, Chile. *Rev Clín Periodoncia Implantol Rehabil Oral*. 2016 Aug;9(2):184-92. <https://doi.org/10.1016/j.piro.2016.07.002>
47. Morales A, Strauss FJ, Hämmerle CH, Romandini M, Cavalla F, Baeza M, et al. Performance of the 2017 AAP/EFP case definition compared with the CDC/AAP definition in population-based studies. *J Periodontol*. 2022 Jul;93(7):1003-13. <https://doi.org/10.1002/JPER.21-0276>
48. Papapanou PN, Sanz M, Buduneli N, Dietrich T, Feres M, Fine DH, et al. Periodontitis: Consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol*. 2018 Jun;89(S1 Suppl 1):S173-82. <https://doi.org/10.1002/JPER.17-0721>
49. Carmona-Meza Z, Parra-Padilla D. Social determinants of health: analysis from the colombian context. *Salud (Barranquilla)*. 2015 Dec;31(3):608-20. <https://doi.org/10.14482/sun.31.3.7685>
50. Albandar JM. Disparities and social determinants of periodontal diseases. *Periodontol 2000*. 2024 Jan;prd.12547. <https://doi.org/10.1111/prd.12547>
51. Yn A. A. A., J. A. Accuracy of estimating periodontitis and its risk association using partial-mouth recordings for surveillance studies: a systematic review and meta-analysis. *Int J Dent*. 2022 Mar;2022:1-16. <https://doi.org/10.1155/2022/7961199>
52. Reitsma MB, Fullman N, Ng M, Salama JS, Abajobir A, Abate KH, et al. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990-2015: a systematic analysis from the Global Burden of Disease Study 2015. *Lancet*. 2017 May;389(10082):1885-906. [https://doi.org/10.1016/S0140-6736\(17\)30819-X](https://doi.org/10.1016/S0140-6736(17)30819-X)

53. Palloni A, Novak B, Pinto-Aguirre G. The enduring effects of smoking in Latin America. *Am J Public Health*. 2015 Jun;105(6):1246-53. <https://doi.org/10.2105/AJPH.2014.302420>
54. Antini C, Caixeta R, Luciani S, Hennis AJ. Diabetes mortality: trends and multi-country analysis of the Americas from 2000 to 2019. *Int J Epidemiol*. 2024 Feb;53(1):dyad182. <https://doi.org/10.1093/ije/dyad182>
55. Vargas-Uricoechea H, Casas-Figueroa LÁ. Epidemiología de la diabetes mellitus en Sudamérica: la experiencia de Colombia. *Clin Investig Arterioscler*. 2016;28(5):245-56. <https://doi.org/10.1016/j.arteri.2015.12.002>
56. Germen M, Baser U, Lacin CC, Fıratlı E, İşsever H, Yalcin F. Periodontitis prevalence, severity, and risk factors: a comparison of the AAP/CDC Case Definition and the EFP/AAP Classification. *Int J Environ Res Public Health*. 2021 Mar;18(7):3459. <https://doi.org/10.3390/ijerph18073459>
57. Raittio E, Baelum V. Justification for the 2017 periodontitis classification in the light of the checklist for modifying disease definitions: a narrative review. *Community Dent Oral Epidemiol*. 2023;51(6):1169-79. <https://doi.org/10.1111/cdoe.12856>
58. Arias C, Soliverez C, Bozzi N. El envejecimiento poblacional en América Latina: aportes para el delineamiento de políticas públicas. *RELASP*. 2020 Dec;1(2):11-23. <https://doi.org/10.35305/rr.v1i2.18>
59. González-Osuna L, Sierra-Cristancho A, Rojas C, Cafferata EA, Melgar-Rodríguez S, Cárdenas AM, et al. Premature senescence of T-cells favors bone loss during osteolytic diseases. a new concern in the osteoimmunology arena. *Aging Dis*. 2021 Aug;12(5):1150-61. <https://doi.org/10.14336/AD.2021.0110>
60. González-Osuna L, Sierra-Cristancho A, Cafferata EA, Melgar-Rodríguez S, Rojas C, Carvajal P, et al. Senescent CD4⁺CD28⁻ T Lymphocytes as a potential driver of Th17/treg imbalance and alveolar bone resorption during periodontitis. *Int J Mol Sci*. 2022 Feb;23(5):2543. <https://doi.org/10.3390/ijms23052543>
61. Romito GA, Feres M, Gamonal J, Gomez M, Carvajal P, Pannuti C, et al. Periodontal disease and its impact on general health in Latin America: LAOHA Consensus Meeting Report. *Braz Oral Res*. 2020;34(suppl 1):e027. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0027>
62. Brito LF, Taboza ZA, Silveira VR, Teixeira AK, Rego RO. Diagnostic accuracy of severe periodontitis case definitions: comparison of the CDC/AAP, EFP/AAP, and CPI criteria. *J Periodontol*. 2022 Jun;93(6):867-76. <https://doi.org/10.1002/JPER.21-0365>
63. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021 Mar;372(71):n71. <https://doi.org/10.1136/bmj.n71>

Burden and impact of periodontal diseases on oral health-related quality of life and systemic diseases and conditions: Latin America and the Caribbean Consensus 2024

Giuseppe Alexandre ROMITO^(a) 
James Rudolph COLLINS^(b) 
Mohamed Ahmed HASSAN^(a) 
Carlos BENÍTEZ^(c) 
Adolfo CONTRERAS^(d) 

^(a)Universidade de São Paulo – USP, School of Dentistry, Department of Periodontics, São Paulo, SP, Brazil.

^(b)Pontificia Universidad Católica Madre y Maestra, School of Dentistry, Department of Periodontology, Santo Domingo, República Dominicana.

^(c)Colgate-Palmolive, Piscataway, NJ, USA.

^(d)Universidad del Valle, School of Dentistry, Discipline of Periodontics, Cali, Colombia.

Declaration of Interests: Carlos Benítez is a Colgate-Palmolive employee.

Corresponding Author:

James Rudolph Collins
E-mail: jamescollins@pucmm.edu.do

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0117>

Abstract: Periodontal diseases are highly prevalent globally, and represent a significant public health burden that could affect the quality of life in Latin American and in Caribbean countries and territories. The primary objective is to explore the existing research and epidemiological studies on the burden of periodontal diseases, particularly their impact on oral health-related quality of life (OHRQoL) and associations with systemic health conditions in Latin America and the Caribbean (LAC). An electronic literature search was conducted across multiple databases, including MEDLINE (PubMed), Scopus, LILACS, SciELO, and Web of Science, without publication date or language limitations, up until December 2023. Reviewers independently assessed titles and abstracts based on the eligibility criteria. The search yielded 1195 articles, with 63 meeting the inclusion criteria. The results of epidemiological studies showed that periodontitis is extremely prevalent at 90% in LAC; severe periodontitis can affect nearly 10% of the adult population and that periodontitis is aggravated by smoking, poverty, low education level, and limited access to proper dental care. Periodontitis was consistently associated with worse OHRQoL; and causing pain, and/or triggering psychological discomfort, physical disability, and social disability. Associations were also reported between periodontitis and comorbidities such as diabetes, cardiovascular disease, rheumatoid arthritis, respiratory disease, mental illness, and adverse pregnancy outcomes that are also affecting the quality of life of individuals and their families. This scoping review offers a thorough examination of the burden of periodontal diseases in LAC and highlights the significant public health concern that it represents for the region.

Keywords: Periodontal Diseases; Quality of Life; Chronic Disease; Oral Health; Latin America; Caribbean Region.

Introduction

Gingivitis and periodontitis are highly prevalent conditions worldwide and represent a major public health burden. They are the most common chronic inflammatory non-communicable disease (NCD)

Submitted: July 30, 2024
Accepted for publication: August 7, 2024
Last revision: August 22, 2024

in humans.¹ In Latin American adolescents from 15 to 18 years of age, the prevalence of CAL $\geq$ 3 mm is 32.6%, and the prevalence of the probing pocket depth $\geq$ 4 mm is 59.3%.² In addition, the prevalence of severe periodontitis in adults reached 7.8% to 25.9% from middle aged adults to seniors, respectively.

Epidemiological studies have shown that the prevalence and severity of periodontal diseases are high, commonly exceeding 90% of the population, if gingivitis is included.² Periodontitis has been associated with poor oral health-related quality of life (OHRQoL), with detriments found in multiple domains, including pain, psychological discomfort, physical disability and social disability.³ There is also evidence of associations between periodontitis and systemic health conditions that are also prevalent in the region, including diabetes, cardiovascular disease,⁴ rheumatoid arthritis,⁵ respiratory disease,⁶ mental illness,^{7,8} and adverse pregnancy outcomes.⁹

The high burden of disease, combined with the impact on quality of life and associations with chronic diseases, emphasizes the need to prioritize periodontal health as an essential public health issue since it is affecting at least half of the 670 million inhabitants in Latin America and the Caribbean countries (LAC).¹⁰ Strategies to reduce this burden include improving oral hygiene practices throughout the life cycle of individuals and promote general health education campaigns, increasing access to professional dental care, incorporating screening and management of periodontitis into managing systemic diseases, and addressing common risk factors such as smoking, malnutrition and the pathophysiological complication of comorbidities.²

The rationale behind this consensus and scoping review stems from the recognition of periodontal diseases as a significant public health challenge in Latin America and the Caribbean (LAC). The widespread prevalence and severity of these conditions, coupled with their impact on Oral Health-Related Quality of Life (OHRQoL) and their association with systemic diseases, point out the need for a comprehensive review of existing evidence. Our objective is to elucidate the scope of the issue, evaluate current knowledge, identify gaps, and provide

recommendations for future research and public health initiatives. This consensus underscores the urgent need for heightened attention to periodontal diseases in LAC and furnishes evidence to inform health promotion, disease prevention, and control strategies for periodontal disease and its most prevalent comorbidities.

Methods

A scoping review was conducted in accordance with the PRISMA extension for Scoping Reviews (PRISMA-ScR). However, as this is an investigation to support the clinical consensus of periodontology in the region, this manuscript was not registered.

Objectives of the scoping review

Primary objective

- a. To explore existing research on the burden of periodontal diseases in Latin America and the Caribbean, with focus on their impact on oral health-related quality of life (OHRQoL) and associations with some systemic health conditions.

Secondary objectives

- a. To map the extent, range, and nature of the literature on periodontal diseases in Latin America and the Caribbean.
- b. Assess the impact of periodontal diseases on OHRQoL in these regions.
- c. Identify gaps in the current literature to inform future research directions.
- d. Provide evidence-based recommendations for public health strategies and interdisciplinary approaches to mitigate the impacts of periodontal diseases.

Focused questions for the scoping review

Q1: What evidence is there with regard to the impact of periodontal diseases in Latin America and the Caribbean, specifically addressing their influence on oral health-related quality of life?

Q2: What evidence is available about the relationship between oral health-related quality of life and the association of these diseases with systemic diseases

and conditions relative to the impact of periodontal diseases in Latin America and the Caribbean?

Eligibility criteria

The inclusion criteria

- Interventional and observational studies (e.g., randomized clinical trials, non-randomized clinical trials, cohort studies, cross-sectional studies)
- Studies that were conducted in Latin America and the Caribbean.
- Studies focused on periodontal diseases.
- Studies examining the impact on oral health-related quality of life.
- Studies exploring associations with systemic diseases and conditions.

The exclusion criteria:

- Studies outside the geographical scope.

- Studies that were not related to periodontal diseases or quality of life.
- Studies with different design and scope (In-vitro, animal, literature reviews)

Search strategy

An electronic literature search was conducted across multiple databases, including MEDLINE (PubMed), Scopus, LILACS, SciELO, and Web of Science. Search strategies for each database were developed based on key terms to retrieve articles focused on the research questions. The main aim was to assess the burden of periodontal disease in combination with systemic diseases, conditions and its impact on the oral health-related quality of life (OHRQoL) of Latin American and Caribbean populations. Different research strategies were created, focused on every specific disease and condition that was reported in Figure 1. Languages

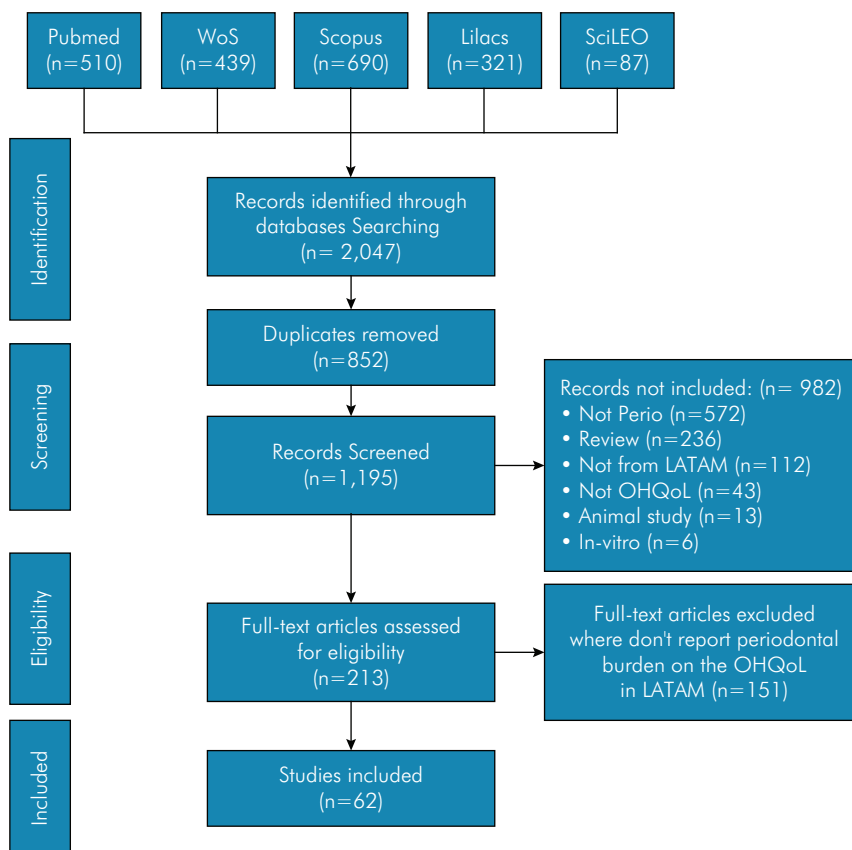


Figure 1. Study flow chart of oral health quality of life and periodontitis articles in Latin America and the Caribbean countries.

of publication include English, Portuguese and Spanish and the date of publication considered was until December 2023.

Study selection

Based on the eligibility criteria, two reviewers (MAH and CB) independently assessed the titles and abstracts of the studies identified by means of the search strategy. Any discrepancies in their assessments was resolved through discussion and, if necessary, by the intervention of a third reviewer (JC, GAR, or AC). Furthermore, (MAH, CB, and JC) evaluated the full texts of studies that met the inclusion criteria or those with ambiguous information in the title and abstract.

Results

The electronic search yielded 1,195 articles. Of these, 63 met the inclusion criteria and were included (Figure 1). Among the articles included, 53 were in English, 8 in Portuguese, and 2 in Spanish. These articles reported data on 48,457 participants from Latin America and the Caribbean region. Article distribution on the subject Periodontal Diseases

on Quality of Life is presented in Figure 2, and the distribution by country is shown in Figure 3.

Consensus of periodontal diseases and OHRQoL in LAC adult population

Untreated periodontal disease could cause a profound impact on individuals' quality of life and revealed a complex interplay between oral health and general health. This interplay was supported by various studies across different countries in Latin America demonstrating the significance of addressing periodontal health as a crucial component of healthcare. In this review, 21 articles were identified for the relationship between periodontal diseases/conditions and quality of life in adult populations as depicted in Table 1.

In Brazil, studies by Palma et al.¹¹ Mourão et al.,¹² and Oliveira et al.¹³ demonstrated the detrimental effects of periodontal diseases on health-related quality of life, demonstrating how these conditions could lead to significant psychological and physical impairments. For example, Palma et al.,¹¹ revealed that approximately 27% of the impact on health-related quality of life could be attributed to the severity of periodontal disease, self-perceived oral health, and

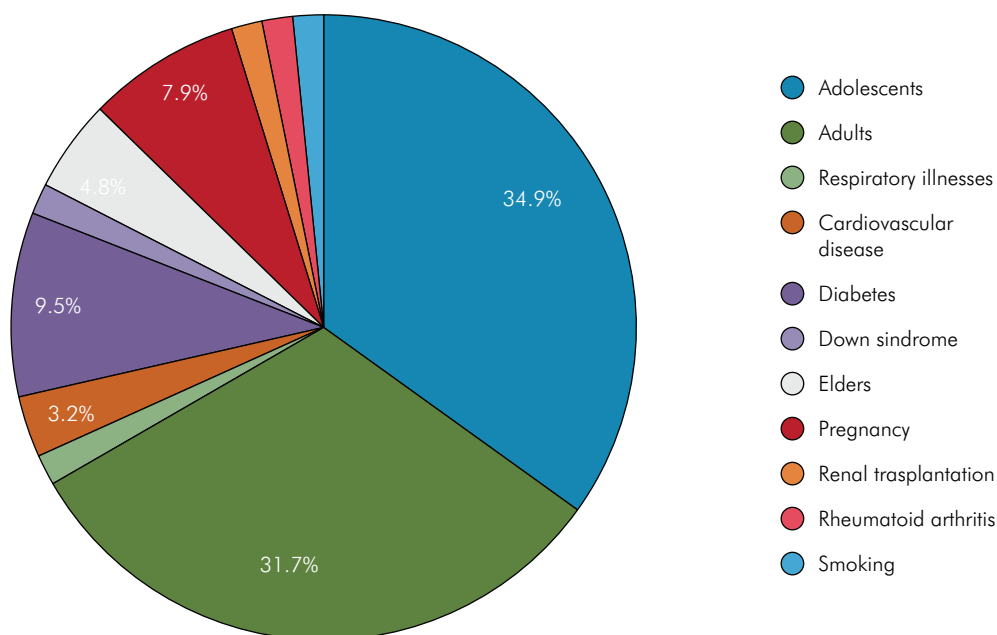


Figure 2. Proportion of articles related to periodontal disease, age of patient group, comorbidities and Quality of Life.

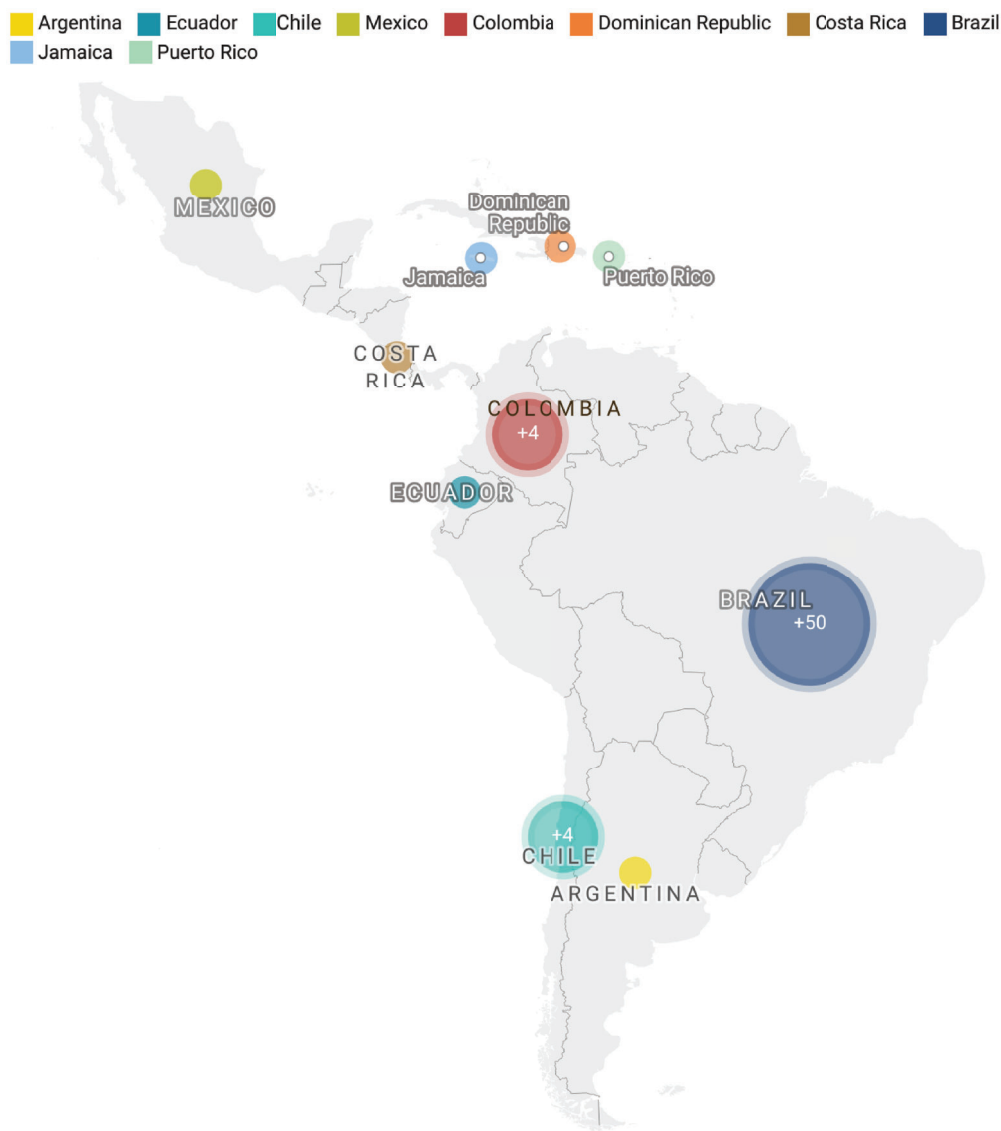


Figure 3. Distribution of articles by country, Brazil (n = 50), Colombia (n = 4), Chile (n = 4), Ecuador (n = 1), Dominican Republic, Jamaica, Puerto Rico (n = 1), Costa Rica (n = 1), Mexico (n = 1), Argentina (n = 1).

the need for prosthetic rehabilitation. Furthermore, Meusel et al.¹⁴ in Brazil further highlighted the exacerbated effects of periodontitis in quality of life among individuals with low educational level. This underscored the importance of integrating oral health into broader health and social policies to improve health care and well-being. It is worth mentioning that Brazil is the most populated country at LAC having 223 million inhabitants with an excellent health care system in which basic oral health care is free for the whole people and in spite of those advantages the

country is facing problems with coverage due to poverty and lack of education.

De La Hoz et al.¹⁵ in Colombia revealed that individuals with moderate periodontitis reported worse OHRQoL than those with mild or severe periodontitis forms, suggesting a complex relationship between disease severity and self-perceived quality of life. This finding underscored the need for comprehensive healthcare approaches encompassing periodontal health to improve overall well-being, particularly in Colombia, where the

Table 1. Publications on the associations between periodontal diseases and conditions on the Quality of life of Latin American and Caribbean adult population.

Author	Country	Sample size	Study design
Bandéca et al. (2011) ³⁰	Brazil	100	Cross-sectional
Collins et al. (2019) ²⁴	Dominican Republic, Jamaica, Puerto Rico	1821	Cross-sectional
Collins et al. (2024) ²⁵			Same population in both studies
De La Hoz Perafan et al., (2023) ¹⁵	Colombia	229	Cross-sectional
Goergen et al. (2023) ¹⁷	Brazil	1022	Cross-sectional
Goergen et al. (2021) ¹⁶	Brazil	1465	Cohort
Rossi et al. (2023) ¹⁸	Brazil	80	Cross-sectional
Llanos et al. (2018) ²⁰	Brazil	52	Cross-sectional
Lopes et al. (2009) ²¹	Brazil	302	Cohort
Melo et al. (2016) ²³	Brazil	36	Cross-sectional
Mendez et al. (2017) ²⁶	Brazil	55	cohort
Meusel et al. (2015) ¹⁴	Brazil	100	Cross-sectional
Mourão et al. (2015) ¹²	Brazil	20	Case-control
Nascimento et al. (2021) ²⁹	Brazil	539	Cohort
Oliveira et al. (2020) ¹³	Brazil	690	Cross-sectional
Palma et al. (2013) ¹¹	Brazil	150	Cross-sectional
Piedra-Hernández et al. (2023) ²²	Costa Rica	82	Cohort
Santuchi et al. (2016) ²⁷	Brazil	90	RCT
Wagner et al. (2016) ¹⁹	Brazil	740	Cross-sectional
Passos-Soares et al. (2018) ³¹	Brazil	306	Cross-sectional

prevalence of periodontitis is high. Colombia is the second largest populated country in Latin America with 52 million inhabitants, in which specialized periodontal treatment is not available for most of the population.

Moreover, studies such as those by Goergen et al.^{16,17} in Brazil explored the broader relationship between oral conditions and quality of life, firstly associated with the staging grading based on the actual diagnostic criteria of periodontal diseases and secondly by encompassing a wide range of dental issues beyond traditional periodontal diseases among which xerostomia, halitosis, caries, and dentin hypersensitivity were significantly and directly associated with negative impacts on QOL. These studies contribute to a more comprehensive understanding of the impact of oral health on quality of life, by acknowledging the interconnectedness of various oral health conditions.

Further specificity was provided by studies examining the impact of periodontal diseases on particular segments of the population or specific conditions related to periodontal health. The research by Wagner et al.¹⁸ on gingival recession, Llanos et al.¹⁹ on aggressive and chronic periodontitis, Lopes et al.²⁰ explored the specific link between chronic periodontitis and quality of life, and Piedra-Hernández et al.²¹ on dental anxiety post non-surgical treatment in Costa Rica. Melo et al.²² also focused on the impact of dentin sensitivity associated with chronic periodontitis on quality of life, main emphasized its manageability with appropriate treatment.

Two studies by Collins et al.^{23,24} explored the connection between gingival health, good oral hygiene habits such as toothbrushing, interdental hygiene practices that were associated with better oral health and self-perception OHRQoL among Caribbean adults in three main Caribbean cities.

Factors such as smoking, infrequent dental visits, and chronic diseases were found to have significant impact on OHRQoL. Overall, this body of evidence offers nuanced views of varied dimensions of the impact of periodontal diseases on quality of life. These studies explore how different aspects of periodontal health, including gingival recession and dental anxiety, influence individuals' daily experiences and overall well-being.

Specific research focusing on treatment methods and their efficacy further deepens this understanding. Mendez et al.²⁵ and Santuchi et al.²⁷ compared different periodontal treatment approaches, and revealed insights into how managing periodontal disease can improve quality of life. These findings emphasize the importance of effective treatment modalities in mitigating the adverse effects of periodontal diseases on OHRQoL.

Moreover, Ruano et al.²⁸ investigated the impact of social factors and gingival bleeding effect on oral health-related quality of life. They discovered a significant correlation between lower individual social capital and poorer OHRQoL among adults using the Brazilian Unified Health System (SUS), pointing out the critical role of social determinants in oral health outcomes. This calls for policies that address social factors to enhance public health.

Finally, research such as that of Nascimento et al.²⁸ showed the impact of clinical and self-reported oral conditions on quality of life, emphasizing the significant influence of self-perception in evaluating oral health outcomes. In this way, the research by Bandéca et al.³⁰ in Brazil illustrated the relationship between self-perception of oral health and clinical factors, emphasizing the significant impact oral health has on individuals' quality of life. This study contributed valuable insights into the dynamics between oral health, self-perception, and quality of life. This perspective is crucial for developing patient-centered care approaches that address clinical needs and individuals' subjective experiences.

The predominance of cross-sectional studies among the articles reviewed highlights a limitation in establishing causality between periodontal diseases and impact in quality of life. This demonstrates the necessity for longitudinal research to understand the temporal

dynamics of these relationships better. Additionally, there is a clear need for expanding research across diverse Latin American countries. These efforts will aid in developing integrated care strategies tailored to the varied cultures and populations in the region, ultimately improving health outcomes for individuals affected by periodontal diseases.

Consensus of periodontal diseases and OHRQoL in LAC adolescents and schoolchildren

We identified 22 cross-sectional and cohort studies from Chile, Brazil, and Ecuador that reported the influence of periodontal diseases in adolescents, with a total population of 36,287 participants (Table 2).

Studies have revealed a correlation between dental caries,³² gingival bleeding,³³⁻³⁵ and advanced forms of periodontal diseases that have substantial negative effects on the quality of life.³⁶⁻³⁹

A cross-sectional study of 9,203 Chilean high school students found that both attachment loss and necrotizing ulcerative gingivitis were significantly associated with higher impacts on oral health-related quality of life (OHRQoL) in adolescents.³⁷

We identified three studies based on Brazilian national surveys. The first cohort study by Peres et al.⁴⁰ analyzed data from 5,445 Brazilian adolescents aged 15–19 y/o who participated in the Brazilian National Oral Health Survey (SBBrasil, 2010) and found that gingival bleeding, dental calculus and periodontal pockets were associated with a negative impact on OHRQoL in adolescents.

The second study was a cross-sectional study by Vettore et al.,⁴¹ analyzing data on 7,208 children aged 12 years from the Brazilian Oral Health Survey (SBBrasil Project). The prevalence of dental caries and gingivitis was 41.5% and 26.6%, respectively. The prevalence of one or more Oral Impacts on Daily Performance (OIDP) items was 39.0% among children with gingivitis. The most prevalent performance influenced by all oral clinical conditions was 'eating'.

The third was a cross-sectional study involving 5,402 adolescents from six macro-regions of São Paulo "SB São Paulo 2015" state survey,⁴⁰ which reported multiple logistic regression for bleeding on probing (BoP) (OR = 1.45, 95%CI: 1.25–1.68; $p < 0.01$), the

Table 2. Publications on the associations between periodontal diseases and conditions on Quality of life of Latin American adolescents and preschool children population.

Author	Country	Sample size	Study summary and main findings
Balseca Ibarra et al. (2023) ³⁴	Ecuador	998	A cross-sectional study found that gingival bleeding negatively impacted OHRQoL, particularly emotional and social well-being.
Lattanzi et al. (2020) ⁴⁷	Brazil	319	A cross-sectional study found better OHRQoL in adolescents participating in a school health program.
Ortiz et al. (2020) ⁴⁸	Brazil	743	A cohort study found gingivitis at baseline was associated with higher overall and emotional OHRQoL scores at 2-year follow-up.
Sfreddo et al. (2019) ⁴⁹	Brazil	747	A 2-year cohort study found adolescents from lower SES backgrounds reported worse OHRQoL at follow-up.
Maia et al. (2018) ³⁸	Brazil	564	A cross-sectional study found dental caries and periodontal pockets negatively impacted OHRQoL, to a greater extent o in remote communities.
Maroneze et al. (2018) ⁵⁰	Brazil	67	A cross-sectional study found bleeding and gingival edema in the anterior region was associated with worse OHRQoL in adolescents.
Machry et al. (2018) ³⁵	Brazil	1,134	A cross-sectional study found that schoolchildren with gingival bleeding had higher OHRQoL scores.
Da Cunha et al. (2017) ⁴²	Brazil	5,402	A cross-sectional study found bleeding on probing and dental calculus was associated with impacted daily activities.
Kaminsky et al. (2016) ³⁶	Brazil	1,417	A cross-sectional study found a 49.6% prevalence of gingival bleeding in adolescents.
Alves et al. (2016) ³³	Brazil	119	Cross-sectional study found the presence of periodontal pockets and dental treatment needs were associated with worse OHRQoL in individuals with intellectual disabilities.
Vettore et al. (2016) ⁴¹	Brazil	4,889	Cross-sectional study found gingivitis was one of the conditions resulting from clustering and predicted poor OHRQoL in children.
Vazquez et al. (2015) ⁵¹	Brazil	1,172	Cross-sectional study found an increase in periodontal index associated with increased negative OHRQoL impact.
Schuch et al. (2015) ⁵²	Brazil	749	Cross-sectional study found dental plaque index >5 and severe malocclusion was associated with worse OHRQoL impact.
Tomoni et al. (2014) ⁵³	Brazil	1,134	Cross-sectional study found extensive-level gingivitis was associated with higher OHRQoL scores, even after adjusting for other factors.
Amato et al. (2014) ⁵⁴	Brazil	50	1-month longitudinal study found improvement in OHRQoL after an educational preventive program.
Peres et al. (2013) ⁴⁰	Brazil	5,445	Cohort study found gingival bleeding, dental calculus and periodontal pockets were associated with negative OHRQoL impact in adolescents.
Paula et al. (2012) ³⁹	Brazil	515	Cross-sectional study found bleeding was associated with worse OHRQoL in schoolchildren.
López & Belum (2007) ³⁵	Chile	9,203	Cross-sectional study found attachment loss and necrotizing ulcerative gingivitis were significantly associated with higher impact on OHRQoL in adolescents.
Núñez-Contreras et al. (2021) ⁴³	Chile	673	Cross-sectional study found no association between gingivitis and worsened quality of life in preschoolers of 3-5 years.
Barbosa et al. (2016) ⁴⁵	Brazil	167	A cross-sectional study found that gingivitis had no significant association with OHRQoL in children and preadolescents.
Barbosa et al. (2012) ⁴⁴	Brazil	145	A cross-sectional study found that bleeding had no impact on symptoms of anxiety or depression in pre-adolescents and school children.
Blazevic et al. (2008) ³²	Brazil	247	A cross-sectional study found no association between periodontal condition (CPI) and OHRQoL in the early adolescent population.

presence of dental calculus (OR = 1.55, 95%CI: 1.34–; $p < 0.01$). BoP and dental calculus are associated with impacted daily activities among adolescents.

Another cross-sectional study from Brazil with 247 adolescents reported that decayed teeth, despite the periodontal condition, correlated with worse OHRQoL.³⁰

As regards the early childhood phase, a cross-sectional study with 673 Chilean children found no association between gingivitis and worsened quality of life in preschoolers aged 3–5 y/o.⁴³ Similar results were reported on 559 pre-adolescent children from the Brazilian population.^{32,44,45}

Children and adolescents with Down syndrome revealed a high prevalence of gingivitis at 91% and periodontitis in 33% of the individuals. Correlations between periodontal disease impact and clinical parameters such as bleeding on probing, probing depth, and attachment loss were statistically significant, affecting the quality of life. This highlights the considerable negative impact of periodontal disease on the daily lives of those with Down syndrome, exacerbating the severity of the condition.⁴⁶

Consensus of periodontal diseases, OHRQoL and diabetes in LAC

The intricate relationship between periodontal disease and diabetes mellitus (DM) is a subject of growing interest within research and clinical practice, given its profound implications for dental and systemic health and its significant impact on oral health-related quality of life (OHRQOL). Research, particularly in Latin America, has shown the bidirectional relationship between oral health and systemic conditions such as diabetes, demonstrating the broad influence of these interconnections on various life aspects.^{55,56} This body of evidence underscores the importance of holistic approaches to managing these conditions (Table 3)

A study conducted by Pinho et al.⁵⁵ in Brazil found that periodontal disease was significantly worse in prevalence, incidence, and severity among

300 diabetics, negatively impacting quality of life. Using OHIP-14 and various clinical criteria, they linked periodontal disease to functional limitation, pain, and psychological and physical disability, underscoring the need for integrated diabetes and periodontal health management. Further reinforcing this perspective, Mourão et al.⁵⁶ in Brazil conducted a study where 250 chronic periodontitis (CP) patients with DM2 in comparison with 250 age and gender-matched controls without DM2. The study found that DM2 significantly worsens the quality of life across all measured domains, including physical, social/family, functional, and emotional, even when diabetes was well-controlled. This points out the complex interaction between periodontal health and systemic diseases. Furthermore, the research suggested that even well-controlled DM2 combined with CP can negatively affect QoL. In line with these observations, Sousa et al.⁵⁷ emphasized the critical role of oral health in the broader spectrum of diabetes management. Their study of 302 individuals in Brazil further established periodontitis as an important factor in diminishing the quality of life among those with type 2 diabetes, reinforcing the call for integrated healthcare interventions that encompass both diabetes and periodontal disease management.

Furthermore, Drumond-Santana et al.⁵⁸ researched 159 diabetic individuals, highlighting the adverse impact of periodontal disease on quality of life and showing a significant correlation between periodontitis and negative quality of life outcomes. This study reinforced the necessity for specialized programs to mitigate the negative effects of periodontal disease on the quality of life of individuals with diabetes. This

Table 3. Publications on the influence of periodontal diseases and diabetes on quality of life in Latin American populations.

Author	Country	Sample size	Study design
De Pinho et al. (2012) ⁵⁵	Brazil	300	Cross-sectional
Drumond-Santana et al. (2007) ⁵⁸	Brazil	159	Cross-sectional
Morales et al. (2021) ⁵⁹	Chile	38	Cohort
Mourão et al. (2016) ⁵⁶	Brazil	500	Cross-sectional
Santos et al. (2020) ⁶⁰	Brazil	59	Cross-sectional
Sousa et al. (2019) ⁵⁷	Brazil	302	Cross-sectional

body of work collectively highlights the multifaceted challenges posed by the interplay between diabetes and periodontal health. More recently, Morales et al.,⁵⁹ in Chile, during the COVID-19 pandemic, observed significant improvements in oral health and overall quality of life following periodontal therapy in 38 DM2 subjects. This finding suggests potential avenues for positive intervention, highlighting the transformative impact of periodontal care on the well-being of diabetic patients.

Whereas Santos et al.⁶⁰ explored the relationship between chronic periodontitis and type 2 diabetes mellitus (DM2) in 59 subjects, with focus on polymorphisms in the vitamin D receptor gene. Moreover, participants' quality of life (QoL) was assessed using the OHIP-14 questionnaire. Aspects such as psychological discomfort, physical pain, and physical disability were reported more frequently among individuals with DM2. However, the dimensions of the OHIP-14 in this study did not show positive associations between the severity of periodontitis and patients' perception of quality of life.

The divergent findings across studies underscore the complexity of the relationship between periodontal disease, diabetes, and quality of life, demonstrating the necessity for further, diverse research in Latin America. Given the unique demographics and environmental factors of the region, well-designed border studies can provide crucial insights, informing effective, culturally tailored interventions. Expanding research across various Latin American countries is essential to develop integrated care strategies that improve health outcomes for affected individuals.

Consensus of periodontal diseases, OHRQoL and pregnancy in LAC

Periodontal diseases have been hypothesized to increase the risk of Adverse Pregnancy Outcomes (APO) such as preterm birth and low birth weight. This association is biologically plausible due to the chronic inflammatory burden of periodontitis. Multiple meta-analyses have concluded that periodontitis increases the risk of preterm birth, low birth weight, and preeclampsia.⁶¹⁻⁶⁴

Studies have consistently shown that the chronic inflammatory conditions associated with periodontal diseases can significantly impact not only oral health but also systemic health, influencing outcomes like preterm birth (PTB), low birth weight (LBW), and prolabor rupture of membranes (PROM). Highlighting this connection, research by Vogt et al.⁶⁵ in Brazil among a cohort of 327 low-risk pregnant women found a clear association between periodontal disease and increased risks of adverse pregnancy outcomes. This underscores the vital need for integrating dental health within prenatal care programs to mitigate such risks, thus emphasizing the critical intersection between oral health and overall systemic well-being (Table 4).

Moreover, the significance of periodontal health extends beyond systemic implications to directly affect the quality of life of pregnant women. Studies by Lopez Rosell et al.⁶⁶ and Moimaz et al.⁶⁷ in Brazil have demonstrated that oral health conditions significantly affect the quality of life, particularly among pregnant women who exhibit a high prevalence of periodontal diseases. These findings call for a comprehensive approach to oral healthcare during pregnancy, and the need to address oral health not just for improving systemic health outcomes but also for its significant influence on the quality of life.

Moreover, research by Cornejo et al.⁶⁸ in Buenos Aires, Argentina, investigated the oral health status of pregnant women from socially deprived populations. Their findings revealed a high prevalence of gingivitis (93.75%) and dental caries (92.1%). Nevertheless, interestingly, the perception of the impact of oral health on quality of life did not always align with the actual oral health status. This discrepancy indicates a complex relationship between oral health, systemic conditions, and quality of life perceptions, suggesting the need for increased awareness and education about oral health among pregnant women.

The association of periodontal diseases with systemic health conditions like obesity and hypertension during pregnancy has also been reported in Brazil by Caracho et al.⁶⁹ Their study reported how systemic health challenges exacerbate periodontal conditions, adversely affecting pregnant women's quality of life, and highlights the importance of

Table 4. Publications on the influence of periodontal diseases and pregnancy on quality of life in Latin American populations.

Author	Country	Sample size	Study design
Caracho et al. (2020) ⁶⁹	Brazil	50	Cross-sectional
Cornejo et al. (2013) ⁶⁸	Argentina	80	Cross-sectional
Drumond-Santana et al. (2007) ⁵⁸	Brazil	159	Cross-sectional
Moimaz et al. (2016) ⁶⁷	Brazil	119	Cross-sectional
Musskopf et al. (2018) ⁶⁴	Brazil	210	RCT
Lopez ROSELL et al. (2013) ⁶⁶	Brazil	51	Cohort

integrating dental care into the broader prenatal healthcare framework to address these interconnected challenges effectively.

The positive impact of periodontal treatment on oral health-related quality of life (OHRQoL) among pregnant women was conclusively demonstrated in a randomized clinical trial by Musskopf et al.⁶⁴ in Brazil. This trial showed significant improvements in OHRQoL for participants receiving periodontal treatment, underscoring the beneficial effects of oral health interventions on systemic health and overall quality of life.

Gestational Diabetes Mellitus (GDM) showed a 22.5% higher prevalence and severity of periodontitis. GDM was associated with a ten times higher risk of preterm birth, despite no difference in infants' birth weight between groups in a cross-sectional study in Brazil.⁷⁰ Relative to the plausibility of APO, a recent cross-sectional study examined the association between maternal overweight/obesity, periodontitis in late pregnancy, and infant birth weight in 100 Brazilian women.⁷¹ Maternal obesity may exacerbate pregnancy-related periodontal inflammation and contribute to poorer fetal growth outcomes. This sheds some light on the socioeconomic factors and the importance of controlling periodontal health to improve maternal and infant well-being.

These studies highlight a compelling case for integrating oral health care into prenatal care regimes across different contexts and populations. The evidence points towards a multifaceted relationship between periodontal diseases, systemic health conditions, and the quality of life of pregnant women, emphasizing the need for comprehensive healthcare strategies that include both oral and systemic health. Further research, especially in Latin American countries,

is crucial to deepen our understanding of these relationships and to develop targeted interventions that can effectively improve the health outcomes for pregnant women and their babies.

Consensus of periodontal diseases, OHRQoL and Smoking in LAC

Epidemiological studies showed a high prevalence of periodontal disease among smokers in Latin American and Caribbean populations.^{72,73} Epidemiological studies were mainly from Mexico, Brazil, Chile, Colombia, Uruguay, Argentina, and Peru, and they reported prevalence ranging from 35% to 90%.⁷⁴⁻⁷⁶ People with severe forms of periodontitis have been reported in 5% to 17% of adults, depending on the population.⁶⁶ Smoking habits were identified as a significant risk factor associated with increased probability and severity of periodontitis.^{73,74}

When considering gingivitis, three Latin American Cities, Mexico City (Mexico), Great Metropolitan Area (Costa Rica), and Bogota (Colombia), reported no correlation between smoking and plaque-induced gingivitis.⁷⁶

When examining the impact of periodontal disease in conjunction with smoking on quality of life in Latin America, only one article was uncovered in the scoping review. Conducted in Brazil by Arruda et al.⁷⁷ this study delved into the subject by focusing on the correlation between Oral Health-Related Quality of Life (OHRQoL) and periodontal status among individuals with varying smoking habits.

This cross-sectional study, conducted in Brazil, enrolled 100 participants and evaluated their periodontal health and OHRQoL using the OHIP-14 scale. The findings revealed that current smokers displayed significantly poorer periodontal

health in terms of bleeding on probing (BOP), clinical attachment loss (CAL), and tooth count compared with never and former smokers. Despite these disparities in periodontal health, the overall impact on OHRQoL did not exhibit significant differences across smoking statuses. However, domains associated with social disability and handicap in the OHIP-14 were notably affected among current smokers.

This study underscores the intricate relationship between periodontal health, smoking, and quality of life, emphasizing the necessity for comprehensive oral health strategies that take into account patients' smoking habits. It also underscores the need for further evidence to delve deeper into this condition and its implications for quality of life.

Consensus of periodontal diseases, OHRQoL and Cardiovascular disease in LAC

The interaction of periodontal diseases and cardiovascular diseases has been explored elsewhere.¹ Both diseases are known to be capable of significantly affecting an individual's quality of life.⁶⁸ With reference to research in Latin America, a study by Rebelo et al.⁴ in Brazil elucidated the complex relationship between periodontal status and systemic arterial hypertension, demonstrating how poor periodontal status mediated the relationship between socio-demographic factors, such as smoking and low income, and the oral health-related quality of life (OHRQoL) in hypertensive adults. This research showed the importance of comprehensive healthcare approaches that included the management of periodontal diseases to enhance the overall quality of life. Moreover, a study conducted by Taques et al.⁷⁹ in Brazil also showed findings on the relationship between periodontal disease and quality of life in patients with circulatory diseases. Researchers found that elders and men showed greater periodontal disease severity, with the elderly also had a lower quality of life in functional capacity and physical aspects. However, the researchers could not find a correlation between the severity of periodontal disease and quality of life indicators.

The scarcity of research on the link between periodontal and cardiovascular diseases in Latin

America and their impact on quality of life underscores a critical need for further regional studies. Addressing this gap is essential to improve public health strategies and enhance quality of life across the region.

Discussion

The current consensus underscores the profound impact of periodontal and systemic diseases/conditions on Oral Health-Related Quality of Life (OHRQoL) among populations in Latin America and the Caribbean. The prevalent and severe nature of periodontal diseases, coupled with their significant association with systemic conditions such as diabetes, cardiovascular diseases, and adverse pregnancy outcomes, emphasizes the pressing need for comprehensive research and public health strategies in the region.

A recent study by Orlandi et al.⁸⁰ investigated the effect of periodontitis treatment on various systemic health outcomes and pregnancy complications in randomized controlled trials with a minimum follow-up of 6 months. The meta-analysis revealed significant reductions in markers such as high-sensitivity C-reactive protein (hs-CRP), interleukin (IL)-6, and plasma glucose, along with improvements in Flow-Mediated Dilation (FMD) and diastolic blood pressure after periodontitis treatment. Additionally, a protective effect on preterm deliveries (< 37 weeks) was observed. However, limited evidence was available regarding the impact on quality of life outcomes, emphasizing the need for further research to confirm the sustainability and universality of these benefits.

The relationship between periodontitis and comorbidities is multifaceted, involving common risk factors, pathophysiology, and bidirectional causal or non-causal relationships. Further well-designed randomized controlled clinical trials are needed to ascertain if periodontitis acts as a modifiable risk factor for associated comorbidities. Understanding these associations holistically may lead to novel therapeutic approaches to periodontitis treatment and management.

Integration of oral health into general health and social policies is crucial for effectively addressing the

underlying causes and consequences of periodontal diseases. This review also advocates for the integration of periodontal care into the management of systemic diseases, by recognizing the bidirectional relationships between periodontal health and certain comorbidities.

Acknowledgement of the limitations of this scoping review is essential for understanding the scope and implications of its findings. While efforts were made to encompass studies from 33 Latin American and Caribbean countries, the distribution of research across these nations should be more balanced to better represent regional impacts. Additionally, the predominance of cross-sectional studies limits the ability to establish causality between periodontal disease, systemic conditions, and quality of life. Variations in demographics, healthcare systems, cultural values, and social determinants of health across the region may also affect the generalizability of the findings to certain populations within Latin America and the Caribbean.

Conclusion

This scoping review provides a comprehensive overview of the burden of periodontal diseases in Latin America and the Caribbean and demonstrates that periodontal diseases is a critical public health issue in the region, with profound implications for societal and individual's overall health and well-being. Quality of life is synergistically affected by the complex periodontitis-comorbidities that are concurrent and pathological interdependent and run along the life cycle and that recent research just started to understand and manage.

Final considerations

The purpose of this Consensus was to provide a comprehensive overview of the latest research on the impact of periodontal diseases on Oral Health-Related Quality of Life (OHRQoL) and systemic diseases and conditions among people in countries from Latin America and the Caribbean (LAC). The region, characterized by its cultural, ethnic, and linguistic diversity, grapples with some of the highest

levels of inequities and inequalities in health and education globally, posing challenges in description, understanding, and approach. Furthermore, poor management of political, economic, and public health services constrains the ability of governments to provide the entire population with equitable and quality health coverage, particularly for periodontal procedures.²⁸

OHRQoL, defined as a multidimensional construct encompassing subjective evaluations of oral health, functional and emotional well-being, and satisfaction in daily life relative to oral health, presents complexities in interpretation and extrapolation across population groups from different countries.⁸¹ In a recent systematic review conducted in LAC, the impact of oral diseases on OHRQoL was explored, revealing that the majority of studies identified a significant impact on OHRQoL in children, adolescents, and adults with oral diseases, including periodontal diseases. Moreover, greater severity of oral disease correlated with a more pronounced impact on OHRQoL.⁸²

Changing individual behaviors for improved oral health and implementing oral health education are considered pivotal yet challenging elements for enhancing knowledge levels and promoting health. These efforts may reduce the risk of periodontal diseases and their complications, thus fostering long-term periodontal and systemic health and overall well-being.^{83,84}

Recent research in the region investigated the relationship between periodontal health knowledge and OHRQoL among Caribbean adults. The findings indicated that individuals with limited knowledge about gum health were more likely to report poorer OHRQoL compared with those who had a higher level of knowledge, highlighting the importance of promoting appropriate attitudes, practices, knowledge, and self-awareness of oral health to enhance both the oral health and quality of life of individuals in the region.²⁴

Future recommendations for research in the LAC region:

Increase representation of epidemiological studies across different countries in Latin America and the Caribbean (LAC) that explore the relationship

between periodontal diseases and Oral Health-Related Quality of Life (OHRQoL). This would provide a more comprehensive understanding of how these conditions impact individuals in diverse cultural and socioeconomic contexts.

Conduct multicenter longitudinal studies in the region to investigate the associations between periodontitis and non-communicable diseases (NCDs), such as cardiovascular diseases, diabetes, and respiratory diseases. Longitudinal research can offer insights into the long-term effects and potential causal relationships between periodontal health and systemic conditions.

Focus research efforts on examining the impact of periodontal diseases on the quality of life of vulnerable populations, including those facing geographical limitations and limited access to oral health services. Understanding how these populations are affected can provide information on how best to target interventions and policies to address disparities in oral health outcomes.

Conduct intervention studies to assess the cost-effectiveness and impact of periodontal treatment on systemic conditions, particularly cardiovascular diseases, adverse pregnancy outcomes, diabetes, and respiratory diseases. Evaluating the benefits of periodontal care in managing these systemic conditions can provide information to guide healthcare decision-making and resource allocation.

Undertake a systematic evaluation of inequalities and inequities in oral health across Latin America and the Caribbean. By identifying disparities in access to oral health services, treatment outcomes, and oral health outcomes, policymakers can implement targeted actions, policies, and programs to reduce inequities and improve oral health equity in the region.

Promote interdisciplinary initiatives involving both public and private sectors to implement programs with the aim of increasing individual knowledge and self-awareness in oral health in the region. Collaborative efforts can leverage resources and expertise from multiple sectors to develop comprehensive oral health promotion strategies that address the diverse needs of populations across Latin America and the Caribbean.

Acknowledgments

This manuscript was prepared for the consensus titled “Latin America and Caribbean Periodontics Consensus 2024” organized by the Latin American Oral Health Association (LAOHA). The consensus process actively engaged experts from across the region, and the broader community was invited to review and contribute to the content. The resulting Consensus Report was derived from this paper. We would like to acknowledge the Colgate Palmolive Company for their support.

References

1. Herrera D, Sanz M, Shapira L, Brotons C, Chapple I, Frese T, et al. Association between periodontal diseases and cardiovascular diseases, diabetes and respiratory diseases: Consensus report of the Joint Workshop by the European Federation of Periodontology (EFP) and the European arm of the World Organization of Family Doctors (WONCA Europe). *J Clin Periodontol*. 2023 Jun;50(6):819-41. <https://doi.org/10.1111/jcpe.13807>
2. Romito GA, Feres M, Gamonal J, Gomez M, Carvajal P, Pannuti C, et al. Periodontal disease and its impact on general health in Latin America: LAOHA Consensus Meeting Report. *Braz Oral Res*. 2020 Apr 9;34(suppl 1):e027. doi: 10.1590/1807-3107bor-2020.vol34.0027
3. Reynolds I, Duane B. Periodontal disease has an impact on patients' quality of life. *Evid Based Dent*. 2018 Mar;19(1):14-5. <https://doi.org/10.1038/sj.ebd.6401287>
4. Rebelo MA, Castro PH, Rebelo Vieira JM, Robinson PG, Vettore MV. Low social position, periodontal disease, and poor oral health-related quality of life in adults with systemic arterial hypertension. *J Periodontol*. 2016 Dec;87(12):1379-87. <https://doi.org/10.1902/jop.2016.160204>
5. Posada-López A, Botero JE, Duque-Castaño JD, Ronda-Pérez E, Agudelo-Suárez AA. Oral health-related quality of life in a group of patients with rheumatoid arthritis. *Dent Med Probl*. 2023;60(1):109-19. <https://doi.org/10.17219/dmp/149455>

6. Brasil-Oliveira R, Cruz ÁA, Souza-Machado A, Pinheiro GP, Inácio DD, Sarmento VA, et al. Oral health-related quality of life in individuals with severe asthma. *J Bras Pneumol*. 2020 Nov;47(1):e20200117. <https://doi.org/10.36416/1806-3756/e20200117>
7. Cai V, Peng Ng C, Zhao J, Siskind D, Kisely S. A systematic review and meta-analysis of the association between periodontal disease and severe mental illness. *Psychosom Med*. 2022 Sep;84(7):836-47. <https://doi.org/10.1097/PSY.0000000000001102>
8. Cunha FA, Cota LO, Cortelli SC, Miranda TB, Neves FS, Cortelli JR, et al. Periodontal condition and levels of bacteria associated with periodontitis in individuals with bipolar affective disorders: a case-control study. *J Periodontol Res*. 2019 Feb;54(1):63-72. <https://doi.org/10.1111/jre.12605>
9. Carvajal P, Vernal R, Reinero D, Malheiros Z, Stewart B, Pannuti CM, et al. Periodontal disease and its impact on general health in Latin America. Section II: Introduction part II. *Braz Oral Res*. 2020 Apr 9;34(suppl 1):e023. doi: 10.1590/1807-3107bor-2020.vol34.0023
10. Contreras Rengifo A. [Health prevention and promotion strategies and their relationship with gingival and periodontal health]. *Revista Clínica de Periodoncia, Implantología Rehabilitación Oral*. 2016; 9(2): 193-202. Spanish. <https://doi.org/10.1016/j.piro.2016.07.003>
11. Palma PV, Caetano PL, Leite IC. Impact of periodontal diseases on health-related quality of life of users of the brazilian unified health system. *Int J Dent*. 2013;2013:150357. <https://doi.org/10.1155/2013/150357>
12. Mourão LC, Cataldo DM, Moutinho H, Canabarro A. Impact of chronic periodontitis on quality-of-life and on the level of blood metabolic markers. *J Indian Soc Periodontol*. 2015;19(2):155-8. <https://doi.org/10.4103/0972-124X.149935>
13. Oliveira LM, David SC, Ardenghi TM, Moreira CH, Zanatta FB. Gingival inflammation influences oral health-related quality of life in individuals living in a rural area of southern Brazil. *J Clin Periodontol*. 2020 Sep;47(9):1028-39. <https://doi.org/10.1111/jcpe.13333>
14. Meusel DR, Ramacciato JC, Motta RH, Brito Júnior RB, Flório FM. Impact of the severity of chronic periodontal disease on quality of life. *J Oral Sci*. 2015 Jun;57(2):87-94. <https://doi.org/10.2334/josnurd.57.87>
15. De La Hoz Perafan R, Romo Pérez C, Fragozo Montesino MF. [Effect of severity of periodontitis on oral health-related quality of life. *Odontoestomatología*. 2023;24(40):1-10. <https://doi.org/10.22592/ode2022n40e224>
16. Goergen J, Albandar JM, Oppermann RV, Rösing CK, Susin C, Haas AN. Periodontitis stage and grade are associated with poor oral-health-related quality of life: findings from the Porto Alegre cohort study. *J Clin Periodontol*. 2021 Oct;48(10):1333-43. <https://doi.org/10.1111/jcpe.13527>
17. Goergen J, Costa RS, Rios FS, Moura MS, Maltz M, Jardim JJ, et al. Oral conditions associated with oral health related quality of life: A population-based cross-sectional study in Brazil. *J Dent*. 2023 Feb;129:104390. <https://doi.org/10.1016/j.jdent.2022.104390>
18. Rossi RG, Gomes BZ, Peixoto RK, Ardenghi TM, Skupien JA, Sfreddo CS. Capital social e qualidade de vida relacionada à saúde bucal de adultos do Sistema Único de Saúde. *RFO UPF*. 2023;26(2):334-46. <https://doi.org/10.5335/rfo.v26i2.13905>
19. Wagner TP, Costa RS, Rios FS, Moura MS, Maltz M, Jardim JJ, et al. Gingival recession and oral health-related quality of life: a population-based cross-sectional study in Brazil. *Community Dent Oral Epidemiol*. 2016 Aug;44(4):390-9. <https://doi.org/10.1111/cdoe.12226>
20. Llanos AH, Silva CG, Ichimura KT, Rebeis ES, Giudicissi M, Romano MM, et al. Impact of aggressive periodontitis and chronic periodontitis on oral health-related quality of life. *Braz Oral Res*. 2018;32(0):e006. <https://doi.org/10.1590/1807-3107bor-2018.vol32.0006>
21. Lopes MW, Gusmao ES, Alves RV, Cimoës R. The impact of chronic periodontitis on quality of life in Brazilian subjects. *Acta Stomatol Croat*. 2009;43(2):89.
22. Piedra-Hernández L, Batista-Cárdenas D, Gómez-Fernández A, Ramírez K. Dental anxiety and oral health-related quality of life before and after non-surgical periodontal treatment. *Clin Oral Investig*. 2023 Sep;27(9):5459-74. <https://doi.org/10.1007/s00784-023-05165-1>
23. Melo TLD, Silva MJCND, Sousa BMD, Freitas SAAD, Pereira ÉM, Pereira ADFV. [Dentin sensitivity and the impact on the quality of life of patients with chronic periodontitis at the Federal University of Maranhão]. *Arq Odontol*. 2016;51(4). Portuguese.
24. Collins JR, Elías AR, Brache M, Veras K, Ogando G, Toro M, et al. Association between gingival parameters and Oral health-related quality of life in Caribbean adults: a population-based cross-sectional study. *BMC Oral Health*. 2019 Nov;19(1):234. <https://doi.org/10.1186/s12903-019-0931-1>
25. Collins JR, Rivas-Tumanyan S, Santosh AB, Boneta AE. Periodontal health knowledge and oral health-related quality of life in Caribbean Adults. *Oral Health Prev Dent*. 2024 Jan;22:9-22. <https://doi.org/10.3290/j.ohpd.b4836035>
26. Mendez M, Melchioris Angst PD, Stadler AF, Oppermann RV, Gomes S. Impacts of supragingival and subgingival periodontal treatments on oral health-related quality of life. *Int J Dent Hyg*. 2017 May;15(2):135-41. <https://doi.org/10.1111/idh.12193>
27. Santuchi CC, Cortelli JR, Cortelli SC, Cota LO, Fonseca DC, Alencar CO, et al. Scaling and root planing per quadrant versus one-stage full-mouth disinfection: assessment of the impact of chronic periodontitis treatment on quality of life: a clinical randomized, Controlled Trial. *J Periodontol*. 2016 Feb;87(2):114-23. <https://doi.org/10.1902/jop.2015.150105>
28. Ruano AL, Rodríguez D, Rossi PG, Maceira D. Understanding inequities in health and health systems in Latin America and the Caribbean: a thematic series. *Int J Equity Health*. 2021 Apr;20(1):94. <https://doi.org/10.1186/s12939-021-01426-1>

29. Nascimento GG, Goettems ML, Schertel Cassiano L, Horta BL, Demarco FF. Clinical and self-reported oral conditions and quality of life in the 1982 Pelotas birth cohort. *J Clin Periodontol*. 2021 Sep;48(9):1200-7. <https://doi.org/10.1111/jcpe.13512>
30. Bandéca MC, Nadalin MR, Calixto LR, Saad JR, Silva SR. Correlation between oral health perception and clinical factors in a Brazilian community. *Community Dent Health*. 2011 Mar;28(1):64-8.
31. Passos-Soares JS, Santos LP, Cruz SSD, Trindade SC, Cerqueira EM, Santos KOB, et al. The impact of caries in combination with periodontitis on oral health-related quality of life in Bahia, Brazil. *J Periodontol*. 2018 Dec;89(12):1407-1417. <https://doi.org/10.1002/JPER.18-0047>
32. Biazevic MG, Rissotto RR, Michel-Crosato E, Mendes LA, Mendes MO. Relationship between oral health and its impact on quality of life among adolescents. *Braz Oral Res*. 2008;22(1):36-42. <https://doi.org/10.1590/S1806-83242008000100007>
33. Alves NS, Gavina VP, Cortellazzi KL, Antunes LA, Silveira FM, Assaf AV. Analysis of clinical, demographic, socioeconomic, and psychosocial determinants of quality of life of persons with intellectual disability: a cross-sectional Study. *Spec Care Dentist*. 2016 Nov;36(6):307-14. <https://doi.org/10.1111/scd.12196>
34. Balseca Ibarra MC, Medina Vega MV, Souto ML, Romito GA, Frias AC, Raggio DP, et al. Impact of gingivitis on oral health-related quality of life in 12-year-old schoolchildren of Quito, Ecuador. *Eur Arch Paediatr Dent*. 2023 Apr;24(2):211-8. <https://doi.org/10.1007/s40368-022-00777-9>
35. Machry RV, Knorst JK, Tomazoni F, Ardenghi TM. School environment and individual factors influence oral health related quality of life in Brazilian children. *Braz Oral Res*. 2018 Jul;32(0):e63. <https://doi.org/10.1590/1807-3107bor-2018.vol32.0063>
36. Kozmihinsky V, Heimer M, Goes P. Sociodemographic factors and oral health conditions related to the impact on the quality of life of adolescents. *Pesqui Bras Odontopediatria Clin Integr*. 2016;16(1):35-42. <https://doi.org/10.4034/PBOCI.2016.161.04>
37. López R, Baelum V. Oral health impact of periodontal diseases in adolescents. *J Dent Res*. 2007 Nov;86(11):1105-9. <https://doi.org/10.1177/154405910708601116>
38. Maia CV, Mendes FM, Normando D. The impact of oral health on quality of life of urban and riverine populations of the Amazon: a multilevel analysis. *PLoS One*. 2018 Nov;13(11):e0208096. <https://doi.org/10.1371/journal.pone.0208096>
39. Paula JS, Leite IC, Almeida AB, Ambrosano GM, Pereira AC, Mialhe FL. The influence of oral health conditions, socioeconomic status and home environment factors on schoolchildren's self-perception of quality of life. *Health Qual Life Outcomes*. 2012 Jan;10(1):6. <https://doi.org/10.1186/1477-7525-10-6>
40. Peres KG, Cascaes AM, Leão AT, Côrtes MI, Vettore MV. Aspectos sociodemográficos e clínicos da qualidade de vida relacionada à saúde bucal em adolescentes. *Rev Saude Publica*. 2013 Dec;47 Suppl 3:19-28. <https://doi.org/10.1590/S0034-8910.2013047004361>
41. Vettore MV, Meira GF, Rebelo MA, Vieira JMR, Machuca C. Multimorbidity patterns of oral clinical conditions, social position, and oral health-related quality of life in a population-based survey of 12-yr-old children. *Eur J Oral Sci*. 2016 Dec;124(6):580-90. <https://doi.org/10.1111/eos.12304>
42. Cunha IP, Pereira AC, Frias AC, Vieira V, Meneghim MC, Batista MJ, et al. Social vulnerability and factors associated with oral impact on daily performance among adolescents. *Health Qual Life Outcomes*. 2017 Aug;15(1):173. <https://doi.org/10.1186/s12955-017-0746-1>
43. Núñez-Contreras J, Hofer-Durán P, Sinsay-Schmeisser J, Zaror C. Impacto de las Condiciones Sociodemográficas y Orales en la Calidad de Vida Relacionada a la Salud Oral en Preescolares de Temuco, Chile. *Int J Odontostomatol*. 2021;15(2):503-12. <https://doi.org/10.4067/S0718-381X2021000200503>
44. Barbosa TS, Castelo PM, Leme MS, Gavião MB. Associations between oral health-related quality of life and emotional statuses in children and preadolescents. *Oral Dis*. 2012 Oct;18(7):639-47. <https://doi.org/10.1111/j.1601-0825.2012.01914.x>
45. Barbosa TS, Gavião MB, Castelo PM, Leme MS. Factors associated with oral health-related quality of life in children and preadolescents: a cross-sectional study. *Oral Health Prev Dent*. 2016;14(2):137-48. <https://doi.org/10.3290/j.ohpd.a35301>
46. Loureiro ACA, Costa FO, Costa EC. The impact of periodontal disease on the quality of life of individuals with Down syndrome. *Downs Syndr Res Pract*. 2007 Jul;12(1):50-4. <https://doi.org/10.3104/reports.1998>
47. Lattanzi AP, Marques AP, Silveira FM, Valente MI, Antunes LA, Cortellazzi KL, et al. The influence of the Brazilian school health program on the oral-health-related quality of life of adolescents. *Braz Oral Res*. 2020;34:e070. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0070>
48. Ortiz FR, Sfreddo CS, Coradini AG, Fagundes ML, Ardenghi TM. Gingivitis influences oral health-related quality of life in adolescents: findings from a cohort study. *Rev Bras Epidemiol*. 2020 Jun 5;23:e200051. <https://doi.org/10.1590/1980-549720200051>
49. Sfreddo CS, Moreira CHC, Nicolau B, Ortiz FR, Ardenghi TM. Socioeconomic inequalities in oral health-related quality of life in adolescents: a cohort study. *Qual Life Res*. 2019 Sep;28(9):2491-2500. <https://doi.org/10.1007/s11136-019-02229-2>
50. Maroneze MC, Goergen LM, Souza RC, Rocha JM, Ardenghi TM. Edema and gingival bleeding in anterior region have a negative influence on quality of life of adolescents. *Braz Oral Res*. 2018 Oct 25;32:e112. <https://doi.org/10.1590/1807-3107bor-2018.vol32.0112>
51. Vazquez Fde L, Cortellazzi KL, Kaieda AK, Guerra LM, Ambrosano GM, Tagliaferro EP, Mialhe FL, et al. Quality of life and socio-dental impact among underprivileged Brazilian adolescents. *Qual Life Res*. 2015 Mar;24(3):661-9. <https://doi.org/10.1007/s11136-014-0795-4>

52. Schuch HS, Costa Fdos S, Torriani DD, Demarco FF, Goettems ML. Oral health-related quality of life of schoolchildren: impact of clinical and psychosocial variables. *Int J Paediatr Dent*. 2015 Sep;25(5):358-65. <https://doi.org/10.1111/ipd.12118>
53. Tomazoni F, Zanatta FB, Tuchenhagen S, da Rosa GN, Del Fabro JP, Ardenghi TM. Association of gingivitis with child oral health-related quality of life. *J Periodontol*. 2014 Nov;85(11):1557-65. <https://doi.org/10.1902/jop.2014.140026>
54. Amato JN, Barbosa TS, Kobayashi FY, Gavião MB. Changes in the oral-health-related quality of life of Brazilian children after an educational preventive programme: an 1-month longitudinal evaluation. *Int J Dent Hyg*. 2014 Aug;12(3):226-33. <https://doi.org/10.1111/idh.12075>
55. Pinho AM, Borges CM, Abreu MH, E Ferreira EF, Vargas AM. Impact of periodontal disease on the quality of life of diabetics based on different clinical diagnostic criteria. *Int J Dent*. 2012;2012:986412. <https://doi.org/10.1155/2012/986412>
56. Mourão LC, Garcia E, Passos D, Lorena T, Canabarro A. Impact of well-controlled type 2 diabetes mellitus on quality of life of chronic periodontitis patients. *J Indian Soc Periodontol*. 2016;20(6):623-6. https://doi.org/10.4103/jisp.jisp_218_16
57. Sousa RV, Pinho RC, Vajgel BD, Paiva SM, Cimões R. Evaluation of oral health-related quality of life in individuals with type 2 diabetes mellitus. *Braz J Oral Sci*. 2019;18:e191431. <https://doi.org/10.20396/bjos.v18i0.8655466>
58. Drumond-Santana T, Costa FO, Zenóbio EG, Soares RV, Santana TD. [Impact of periodontal disease on quality of life for dentate diabetics]. *Cad Saude Publica*. 2007 Mar;23(3):637-44. Portuguese. <https://doi.org/10.1590/s0102-311x2007000300022>
59. Morales A, Corral-Nuñez C, Galaz C, Henríquez L, Mery M, Mesa C, et al. Impact of COVID-19 pandemic on quality of life of type II diabetes patients with periodontitis. *Front Oral Health*. 2021 Jun;2:682219. <https://doi.org/10.3389/froh.2021.682219>
60. Santos RC, Pinho RC, Cimões R. Chronic periodontitis in patients with type 2 Diabetes: analysis of the fohl polymorphism and perception of quality of life. *Pesqui Bras Odontopediatria Clin Integr*. 2020;20:e4395. <https://doi.org/10.1590/pboci.2020.149>
61. Figueiredo MG, Takita SY, Dourado BM, Mendes HS, Terakado EO, Nunes HR, et al. Periodontal disease: repercussions in pregnant woman and newborn health: a cohort study. *PLoS One*. 2019 Nov;14(11):e0225036. <https://doi.org/10.1371/journal.pone.0225036>
62. Fischer RG, Lira Junior R, Retamal-Valdes B, Figueiredo LC, Malheiros Z, Stewart B, et al. Periodontal disease and its impact on general health in Latin America. Section V: Treatment of periodontitis. *Braz Oral Res*. 2020 Apr 9;34(suppl 1):e026. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0026>
63. López NJ, Silva I, Ipinza J, Gutiérrez J. Periodontal therapy reduces the rate of preterm low birth weight in women with pregnancy-associated gingivitis. *J Periodontol*. 2005 Nov;76(11 Suppl):2144-53. <https://doi.org/10.1902/jop.2005.76.11-S.2144>
64. Musskopf ML, Milanese FC, Rocha JM, Fiorini T, Moreira CH, Susin C, et al. Oral health related quality of life among pregnant women: a randomized controlled trial. *Braz Oral Res*. 2018;32(0):e002. <https://doi.org/10.1590/1807-3107bor-2018.vol32.0002>
65. Vogt M, Sallum AW, Cecatti JG, Morais SS. Periodontal disease and some adverse perinatal outcomes in a cohort of low risk pregnant women. *Reprod Health*. 2010 Nov;7(1):29. <https://doi.org/10.1186/1742-4755-7-29>
66. Lopez Rosell FL, Oliveira ALB, Tagliaferro EP, Silva RC, Valsecki Júnior A [Impact of oral health problems on the quality of life of pregnant women]. *Pesqui Bras Odontopediatria Clin Integr*. 2013;13(3):287-93. Portuguese.
67. Moimaz SA, Rocha NB, Garbin AJ, Garbin CA, Saliba O. Influence of oral health on quality of life in pregnant women. *Acta Odontol Latinoam*. 2016 Sep;29(2):186-193.
68. Cornejo C, Rossi G, Rama A, Gomez-Gutierrez N, Alvaredo G, Squassi A, et al. Oral health status and oral health-related quality of life in pregnant women from socially deprived populations. *Acta Odontol Latinoam*. 2013;26(2):68-74.
69. Caracho RA, Foratori-Junior GA, Fusco ND, Jesuino BG, Missio AL, Sales-Peres SH. Systemic conditions and oral health-related quality of life of pregnant women of normal weight and who are overweight. *Int Dent J*. 2020 Aug;70(4):287-95. <https://doi.org/10.1111/idj.12547>
70. Damante CA, Foratori GA, Cunha PO, Negrato CA, Sales-Peres SH, Zangrando MS, et al. Association among gestational diabetes mellitus, periodontitis and prematurity: a cross-sectional study. *Arch Endocrinol Metab*. 2022 Mar;66(1):58-67. <https://doi.org/10.20945/2359-3997000000435>
71. Foratori-Junior GA, Jesuino BG, Caracho RA, Orenha ES, Groppo FC, Sales-Peres SH. Association between excessive maternal weight, periodontitis during the third trimester of pregnancy, and infants' health at birth. *J Appl Oral Sci*. 2020 Mar;28:e20190351. <https://doi.org/10.1590/1678-7757-2019-0351>
72. Jiménez MC, Sanders AE, Mauriello SM, Kaste LM, Beck JD. Prevalence of periodontitis according to Hispanic or Latino background among study participants of the Hispanic Community Health Study/Study of Latinos. *J Am Dent Assoc*. 2014 Aug;145(8):805-16. <https://doi.org/10.14219/jada.2014.31>
73. Susin C, Oppermann RV, Haugejorden O, Albandar JM. Periodontal attachment loss attributable to cigarette smoking in an urban Brazilian population. *J Clin Periodontol*. 2004 Nov;31(11):951-8. <https://doi.org/10.1111/j.1600-051x.2004.00588.x>
74. Borges-Yáñez SA, Irigoyen-Camacho ME, Maupomé G. Risk factors and prevalence of periodontitis in community-dwelling elders in Mexico. *J Clin Periodontol*. 2006 Mar;33(3):184-94. <https://doi.org/10.1111/j.1600-051X.2006.00897.x>
75. Gamonal J, Mendoza C, Espinoza I, Muñoz A, Urzúa I, Aranda W, et al. Clinical attachment loss in Chilean adult population: First Chilean National Dental Examination Survey. *J Periodontol*. 2010 Oct;81(10):1403-10. <https://doi.org/10.1902/jop.2010.100148>

76. Murillo G, Vargas MA, Castillo J, Serrano JJ, Ramirez GM. HumbertoViales J, Benitez CG. Prevalence and severity of plaque-induced gingivitis in three Latin American cities: Mexico City-Mexico, Great Metropolitan Area-Costa Rica and Bogota-Colombia. *Odovtos*. 2018;20(2):91-102. <https://doi.org/10.15517/ijds.v20i2.32451>
77. Arruda CV, Guilardi IJ, Pavan LM, Greggianin BF. Oral health-related quality of life and periodontal status according to smoking status. *Int J Dent Hyg*. 2024 May;22(2):368-75. <https://doi.org/10.1111/idh.12720>
78. Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: a call for global action. *J Clin Periodontol*. 2017 May;44(5):456-62. <https://doi.org/10.1111/jcpe.12732>
79. Taques L, López LZ, Taques Neto L, Arcaro G, Muller EV, Santos FA, et al. Periodontal disease and quality of life in patients with circulatory diseases. *Rev Odontol UNESP*. 2023;52:e20230004. <https://doi.org/10.1590/1807-2577.00423>
80. Orlandi M, Muñoz Aguilera E, Marletta D, Petrie A, Suvan J, D'Aiuto F. Impact of the treatment of periodontitis on systemic health and quality of life: a systematic review. *J Clin Periodontol*. 2022 Jun;49(S24 Suppl 24):314-27. <https://doi.org/10.1111/jcpe.13554>
81. Bennadi D, Reddy CV. Oral health related quality of life. *J Int Soc Prev Community Dent*. 2013 Jan;3(1):1-6. <https://doi.org/10.4103/2231-0762.115700>
82. Yactayo-Alburquerque MT, Alen-Méndez ML, Azañedo D, Comandé D, Hernández-Vásquez A. Impact of oral diseases on oral health-related quality of life: a systematic review of studies conducted in Latin America and the Caribbean. *PLoS One*. 2021 Jun;16(6):e0252578. <https://doi.org/10.1371/journal.pone.0252578>
83. Nascimento TAR, Costa JV, Guerra RO. Periodontal disease in the Brazilian population: a retrospective analysis on the 2013 National Health Survey to Identifying Risk Profiles. *Int J Dent*. 2022 Oct;2022:5430473. <https://doi.org/10.1155/2022/5430473>
84. Wilder RS, Bray KS. Improving periodontal outcomes: merging clinical and behavioral science. *Periodontol 2000*. 2016 Jun;71(1):65-81. <https://doi.org/10.1111/prd.12125>

Risk factors of periodontal disease: Latin America and the Caribbean Consensus 2024

Claudio Mendes PANNUTI^(a) 
Marco Antonio ALARCÓN^(b) 
Gloria Marcela RAMÍREZ LEMUS^(c) 
Paula YUNES FRAGOSO^(d) 
Belen Stephanie RETAMAL-VALDES^(e) 
Marco CORNEJO-OVALLE^(f) 
Poliana Mendes DUARTE^(g) 
Fabio Renato Manzolli LEITE^(h) 
Xiomara GIMENEZ⁽ⁱ⁾ 

^(a)Universidade de São Paulo – USP, School of Dentistry, Department of Stomatology, São Paulo, SP, Brazil.

^(b)Universidad Peruana Cayetano Heredia, Academic Department of Clinical Stomatology, Lima, Perú.

^(c)Pontificia Universidad Javeriana, Bogotá, Colombia

^(d)Universidad Iberoamericana, Biomaterials and Dentistry Research Center, Research and Innovation Department, Santo Domingo, Dominican Republic.

^(e)RS Master Saúde, Department of Periodontology, Arujá, Brazil.

^(f)Universidad de Chile, Facultad de Odontología, Instituto de Investigación, Santiago, Chile.

^(g)University of Florida, College of Dentistry, Department of Periodontology, Gainesville, FL, USA.

^(h)National Dental Research Institute Singapore – NDRIS, National Dental Centre Singapore, Singapore.

⁽ⁱ⁾Universidad Central de Venezuela. Caracas, Venezuela.

Declaration of Interests: The authors certify that they have no commercial or associative interest that represents a conflict of interest in connection with the manuscript.

Corresponding Author:
Marco Antonio Alarcón
E-mail: marco.alarcon@upch.pe

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0118>

Submitted: August 3, 2024
Accepted for publication: August 8, 2024
Last revision: September 2, 2024

Abstract: There is scarcity of information on the determinants of periodontitis in Latin America and Caribbean countries. We conducted a comprehensive review of studies examining the association of smoking and diabetes with periodontitis outcomes in this region. We searched for population-based, cross-sectional and prospective cohort studies from Latin America and the Caribbean region that reported on the association between smoking or diabetes and periodontitis. Databases were searched up to October 2023 by two reviewers. Subsequently, two authors independently conducted a rigorous data extraction process, focusing on study characteristics, the definition of exposures, and periodontitis outcomes, including measures of association and main findings. The results revealed a significant association between smoking and periodontitis, with a stronger effect observed in heavy smokers. Conversely, while some studies observed a higher prevalence of periodontitis among diabetic individuals, the association between diabetes and periodontitis was not significant after adjusting for confounding factors. These findings underscore a significant research gap in population-based studies on the effect of smoking and diabetes on periodontitis within Latin American and Caribbean countries, particularly when it comes to cohort studies. Addressing these gaps is crucial for a deeper understanding of these associations, which could lead to more effective prevention and treatment strategies in the region.

Keywords: Periodontitis; Risk Factors; Smoking; Diabetes Mellitus.

Introduction

Periodontitis poses a public health problem due to its high prevalence, chronic nature, impact on quality of life, and role in health disparities.¹ Moreover, the economic burden associated with its treatment costs places strains on healthcare systems.²

As with many non-communicable diseases, such as cancer, type 2 diabetes mellitus and cardiovascular diseases, the development and progression of periodontitis are influenced by a combination of genetic, environmental, and behavioral factors.³

Some exposures that have been associated with periodontitis include age, socioeconomic status, stress, obesity and genetic predisposition.⁴⁻⁶ Evidence robustly identifies smoking and type 2 diabetes as well-established

causes of periodontitis⁷⁻⁹ that play pivotal roles not only in disease pathogenesis but also in its prevention and treatment response.^{10,11}

This paper reviews the studies investigating the association of smoking and diabetes with periodontitis outcomes in Latin America and Caribbean countries. Information synthesis in areas such as these is crucial for several reasons. Firstly, Latin American populations may encounter unique genetic, environmental, and lifestyle factors influencing these associations, emphasizing the need to tailored public health interventions and clinical management. Secondly, understanding the findings can help address health inequities, facilitate targeted awareness and prevention programs, and guide the development of effective public health interventions. Furthermore, it can foster interdisciplinary collaboration among health professionals and public health experts, ultimately enhancing oral and systemic health outcomes in this region.

Methods

Inclusion and exclusion criteria

Population-based, cross-sectional and prospective cohort studies conducted in the countries of Latin America and the Caribbean were targeted. Only those presenting data on smoking and/or diabetes as the exposure, with periodontitis as the outcome, were included. Those assessing smoking or diabetes but lacking reports of associations with periodontitis were excluded.

Search strategy

MEDLINE-PubMed, SCOPUS, and EMBASE databases were searched up to October 2023. The search strategy can be found on the Open Science Framework webpage (https://osf.io/wt5bv/?view_only=d3fdff9e108e43c6ad57227a195f17ba). Two authors (PM and GR) independently screened the retrieved articles. Studies that met the inclusion criteria and those with insufficient information in titles and abstracts were submitted to full manuscript evaluation. Subsequently, the studies selected were submitted to data extraction.

Data extraction

Two reviewers (MAAP and BRV) independently extracted the following data:

Publication details: authors and publication year.

Characteristics of the study: country of data collection, study design, sample characteristics, sample size calculation, potential confounders and other variables, methods used to assess diabetes and/or smoking (exposures), and periodontitis (outcome).

Results: measure of association between the exposure and periodontitis, and the main findings.

After data extraction, a descriptive analysis of the articles was performed.

Results

For the association between smoking and periodontitis, 230 publications in PUBMED, 225 in Embase, and 258 in Scopus were found (total: 713 hits with 211 duplicates, resulting in 502 publications to read title and abstract). For the relationship between diabetes and periodontitis, 114 publications in PUBMED, 163 in Embase, and 184 in Scopus were retrieved (Total: 461 hits with 143 duplicates, resulting in 318 publications to analyze titles and abstracts). After full-text reading, data were extracted from 11 studies.

Smoking

A total of 11 studies on the association between smoking and periodontitis were included (Table 1). Eight studies were conducted in Brazil,¹²⁻¹⁹ two in Chile^{20,21} and one in Colombia.²² The majority of the studies were cross-sectional, except for two prospective population-based cohorts: one with a 5-year follow-up¹⁸ and another with individuals born in 1982.¹⁹

The sample size ranged from 165¹⁴ to 9,821 individuals,²² with ages ranging from 12²⁰ to 103 years.¹² Sample size estimation was calculated *a priori* in 10 of the 11 studies, apart from one study.¹⁴

In six studies, the definition of exposure was based on the total number of packs smoked.^{12-14,17,18,20} Two investigations categorized subjects as either smokers (current or former smokers) or never-smokers,^{19,21} and the remaining three studies did not report their definition of smoking status.

Table 1. Descriptive analysis of the articles related to smoking and periodontitis.

Authors (year)	Country	Study design	Population and sample	Age range	Prior sample size estimation	Exposure definition (DM)	Outcome definition	Other variables	Association of periodontitis with smoking. Effect size [95%CI]	Main findings
López et al. (2001) ²⁰	Chile	Cross-sectional	9,203 students from 98 high schools in the province of Santiago	12-21	Yes	Number of packs smoked, defined as "the number of cigarettes smoked daily *365* duration of smoking in years/20." Exposure was categorized as: 1 to 250, 251 to 500, > 500 packs.	Occurrence of ≥ 2 teeth with interproximal $CAL \geq 1$ mm, or ≥ 1 tooth with interproximal $CAL \geq 3$ mm	Age, gender, tooth brushing frequency, last visit to the dentist, governmental support, Diabetes	OR - Presence of ≥ 2 teeth with $CAL \geq 1$mm: All sites 1-250: 0.90 [0.78-1.03] 251-500: 1.00 [0.83-1.20] > 500: 1.16 [0.93-1.46] Interproximal only 1-250: 0.94 [0.82-1.07] 251-500: 1.00 [0.83-1.21] > 500: 1.15 [0.93-1.43] OR - Presence of ≥ 1 teeth with $CAL \geq 3$mm: All sites 1-250: 1.02 [0.74-1.41] 251-500: 0.96 [0.64-1.44] > 500: 1.14 [0.75-1.74] Interproximal only 1-250: 0.98 [0.71-1.36] 251-500: 0.98 [0.63-1.53] > 500: 1.10 [0.68-1.74]	The study failed to demonstrate a strong and statistically significant association between smoking and CAL

Continue

Continuation

Susin et al. (2004) ¹²	Brazil	Cross-sectional	843 subjects >30 years living in the metropolitan area of Porto Alegre	30–103	Yes	Number of packs consumed in a life-time: number of cigarettes smoked per day multiplied by the number of years of habit, and divided by 20 (one pack): Non-smokers, light (1 to 2,734 packs), moderate (2,735 to 7,300 packs) and heavy smokers ($\geq 7,300$ packs).	Percentage of teeth with: Severe CAL: CAL ≥ 5 mm in > 50% of teeth	CAL (RRR)	Aging and moderate to heavy cigarette smoking significantly increased the risk for moderate and severe CAL
Susin; Albandar (2005) ¹³	Brazil	Cross-sectional	612 youngsters living in the metropolitan area of Porto Alegre	14–29	Yes	Non-smokers (<1 cigarette packs in a lifetime) Light (1 to 912 packs) Moderate/heavy smokers (>912 packs)	AgP depending on age: Aged 14–19: >4 teeth with CAL ≥ 4 mm. Aged 20–29: >4 teeth with CAL ≥ 5 mm.	AgP (OR): None (reference) Light: 0.6 [0.1–2.4] Moderate/heavy: 3.1 [1.2–8.3]*	Smoking was a significant risk indicator for AgP in this young population.

Continue

Continuation

Moimaz et al. (2009) ¹⁴	Brazil	Cross-sectional	165 individuals > 30 years living in rural Araçatuba	35–66	NR	Number of packs smoked: number of cigarettes smoked daily multiplied by the number of days of habit and divided by 20 (one pack). Former smoker: who had smoked in the past but do not smoke any more. Never- smokers Light (1 to 2,734 packs) Moderate (2,735 to 7,300 packs) Heavy smokers (≥7,300 packs)	Presence of periodontal pockets, defined as having ≥ 1 periodontal pocket of ≥ 4 mm around the index teeth (CPI scores: 3 and 4) NR	Presence of periodontal pockets (OR) Non-smokers: reference Current smokers: 11.18 [4.69–26.62]* Former smokers: 9.24 [3.29–25.96]*	Smoking was strongly associated with periodontitis. There was a relationship with dose and duration of smoking.
Gamonal et al. (2010) ²¹	Chile	Cross-sectional	1561 adults. Clinical evaluations in dental public primary care health centers	Two groups: 35–44 65–74	Yes	Never-smokers or Smokers (current or former smokers).	Prevalence of CAL, defined as the percentage of participants with ≥ 1 site with the condition. Extent was defined as the percentage of teeth displaying the condition.	Age, sex, Education, monthly income, Diabetes CAL (OR): ≥ 3 mm 1.4 [0.9–2.3] ≥ 4 mm 1.3 [1.0–1.8]* ≥ 5 mm 1.3 [1.0–1.6]* ≥ 6 mm 1.3 [1.0–1.7]*	Age (65 to 74 years), sex (male), low education level (≤ 12 years of education), and smoking were risk indicators for CAL > 6 mm in ≥ 1 site
Silva et al. (2010) ¹⁵	Brazil	Cross-sectional	300 individuals with diabetes from Public health facilities in Belo Horizonte	30–86	Yes	NR	Prevalence of periodontitis defined as CAL ≥ 3 mm in ≥ 2 non-adjacent teeth or CAL ≥ 5 mm in 30% of the teeth (EFP; Tonetti & Claffey, 2005).	CAL (PR) non-smokers: Reference Tobacco users: 1.71 [1.10–2.65]*	Multiple determinants, among them smoking, are associated to the prevalence of periodontitis among patients with diabetes

Continue

Continuation

					Two outcomes: Bleeding (CPI = 1) and dental calculus (CPI = 2), and presence of moderate (CPI=3) or deep (CPI=4) periodontal pockets				Prevalence of gingival bleeding and dental calculus were significantly associated to male sex (PR=1.12), smoking (PR=1.11), school level < eight years of study (PR=1.14), & no dental care for >2 years (PR=1.19).
Frias et al. (2011) ¹⁶	Brazil	Cross-sectional	263 subjects living in Guarulhos	35–44	Yes	NR	Sex, education and access to dental care	Bleeding & dental calculus 1.11 [1.02–1.21]* Periodontal pockets 1.71 [1.07–2.73]*	
Susin al. (2011) ¹⁷	Brazil	Cross-sectional	612 individuals living in the metropolitan area of Porto Alegre	14–29	Yes	Non-smokers (<1 pack of cigarettes in a lifetime) Light (1–499 packs) Moderate (500–1499 packs) Heavy smokers (≥1500 packs).	Age, supragingival calculus, Dental visits Supragingival calculus Chronic periodontitis defined as CAL ≥3mm affecting the interproximal sites of >2 teeth.	Chronic Periodontitis CAL (OR) Non-smokers = reference Light/moderate: 0.9 [0.6–1.3] Heavy: 1.7 [1.1–2.7]*	Age, socioeconomic status, smoking and supragingival calculus were significantly associated with chronic periodontitis.
Haas et al. (2014) ¹⁸	Brazil	Prospective population- based cohort of 5 years of follow-up	653 individuals from the Metropolitan area of Porto Alegre	14	Yes	Packyears of smoking calculated by multiplying the number of packs consumed per day by the number of years of habit. To facilitate the interpretation of the results, estimates of lifetime smoking were divided by 10 so that risk estimates reflect changes in risk for 10 packyears of smoking. Smoking exposure 0 packyears 1–14 packyears ≥15 packyears	Age, gender, marital status, skin color, education, socioeconomic status, interproximal cleaning, dental care, diabetes	CAL progression ≥3mm in ≥2 teeth (RR) 0 = reference 1–14: 1.12 [0.91–1.40] >15: 1.39 [1.10–1.76]* CAL progression ≥3mm in ≥4 teeth (RR) 0 = reference 1–14: 1.22 [0.88–1.71] >15: 1.54 [1.06–2.24]*	Age, gender, education and smoking were independent risk factors for CAL progression in an urban population from South Brazil.

Continue

Continuation

Serrano; Suárez (2019) ²²	Colombia	Cross-sectional	9821 adults from a national sample of Colombian adults, held by the Colombian Health Ministry, living in urban and rural areas	Yes	Presence of smoking behavior was analyzed by a self-reported questionnaire, categorized as: current smokers, occasional smokers, former smokers or non-smokers. Definitions were not reported. (NR)	Periodontitis according to two classification systems: 1) AAP- CDC (Page, et al., 2012): mild, moderate and severe periodontitis. Severe periodontitis cases: ≥ 2 interproximal sites with CAL ≥ 6 mm, and ≥ 1 site with PD ≥ 5 mm. 2) EFP periodontitis case definition (Tonetti and Claffey, 2005).	Age, gender, Living area (rural / urban), health insurance system, income, Toothbrushing, Dental floss use, Reason for dental visits, Diabetes	Periodontitis (CDC-AAP) (OR) Non-smoker: reference Current smoker: 1.09 [0.9–1.3] Former smoker: 1.28 [1.2–1.4]* Periodontitis (EFP) (OR) Non-smoker: reference Current smoker: 1.57 [1.2–1.7]* Former smoker: 1.14 [1.0–1.2]	Prevalence of severe periodontitis was significantly associated with age, gender, income, smoking behavior, and diabetic status.
Schuch et al. (2019) ¹⁹	Brazil	Prospective population-based birth cohort	539 individuals from 3 maternity hospitals in Pelotas city. All 5,914 children born in 1982 were invited to participate.	Yes	Smoking status and dental hygiene at age 24 were the mediators between socioeconomic position and periodontitis. Smoking status was dichotomized as current or former smoker versus non-smoker.	Periodontitis according to CDC and AAP: Mild: ≥ 2 interproximal sites with CAL ≥ 3 mm, and ≥ 2 interproximal sites with PD ≥ 4 mm (not on the same tooth) or one site with PD ≥ 5 mm.	Sex, socioeconomic position, income, Dental calculus	Periodontitis (RR) CAL	An association was observed between the more severe level of periodontitis and being a smoker at age 24, as well as having undertaken less than 12 years of study

Continue

Continuation

Moderate: ≥ 2 interproximal sites with CAL ≥ 4 mm (not on the same tooth), or ≥ 2 interproximal sites with PD ≥ 5 mm (not on the same tooth).	Education	Crude RR mild periodontitis
Severe: ≥ 2 interproximal sites with CAL ≥ 6 mm (not on the same tooth) and ≥ 1 interproximal site with PD ≥ 5 mm.		Non-smoker: reference
		Smoker at age 24: 1.2 [0.7–2.0]
		Crude RR Moderate to Severe periodontitis
		Non-smoker: reference
		Smoker at age 24: 1.6 [0.9–2.8]

* Statistically significant. AgP: aggressive periodontitis, NR: not reported; CAL: clinical attachment loss; PD: probing depth; OR: odds ratio; RRR: relative risk ratio; PR: prevalence ratio; RR: risk ratio; CPI: community periodontal index; CDC: Center for Disease Control and Prevention; AAP: American Academy of Periodontology; EFP: European Federation of Periodontology.

Clinical attachment loss (CAL) was the main clinical outcome used to define the periodontal status in nine of the studies included. Another study used the presence of periodontal pockets as its outcome¹⁴ and one defined periodontitis based on the Community Periodontal Index (CPI).¹⁶ Age, sex, diabetes, dental consultation attendance, education, and other socioeconomic factors were the main covariables evaluated in the studies.

A significant positive association between smoking and periodontitis was observed in the majority of the studies, with a stronger association observed among heavy smokers. After adjusting for confounding factors, the association vanished in one study using an adolescent population, probably due to the reduced sample size and more reduced exposure to tobacco along the life-course.²⁰

Diabetes

Six studies on the association between diabetes and periodontitis were included in the present review (Table 2). Three studies were developed in Brazil,^{12,15,18} two in Chile^{20,21} and one in Colombia.²² Five studies were cross-sectional^{12,15,20,21,22} and one was a prospective population-based cohort with a 5-year follow-up.¹⁸ The sample ranged from 300¹⁵ to 9,821 individuals²² aged from 12 to 103 years. Sample size estimation was performed before conducting all six studies. One study defined diabetes based on medical diagnosis,¹⁵ three studies used the patient's self-report of diabetes^{18,21,22} while two articles did not report how the diabetic status was determined.^{12,20} CAL was the main clinical outcome used to define the periodontal status in all included studies. Age, sex, smoking status, education and socioeconomic factors were the other main variables evaluated in the studies. Significant positive statistical associations between diabetes and periodontitis were observed in the majority of studies,^{12,15,18,21,22} except for one.²⁰ However, the association between diabetes and periodontitis was no longer significant in some studies when confounding factors were considered.^{12,18,21} A potential explanation could be the study participants' lack of awareness of their

current blood glucose level, introducing bias into the analyses by including people with high glucose levels in the 'health' category and also by placing people who live with diabetes but maintain adequate glucose levels in the 'diabetes' category.

Conclusion, research gaps and future perspectives

Compiling scientific epidemiological data on the relationship between periodontitis, diabetes, and smoking in Latin American and Caribbean populations is of utmost importance. This effort can reveal the unique challenges faced in these countries, help guide public health preventive and therapeutic strategies, highlight gaps in the existing literature, and identify areas for future research. Due to the design of the studies, the influence of specific environmental factors and genetic traits in the association between smoking or diabetes and periodontitis could not be determined. Future studies may focus on these areas to help define public policies and recommendations tailored to the Latin American and Caribbean populations.

The findings of this review are consistent with those of a previous systematic review⁸ that underscores cigarette smoking as a risk factor for periodontitis, particularly among heavy smokers. This consistent association across various investigations in different Latin American countries reinforces the harmful impact of smoking on periodontal health, indicating the need for targeted public health interventions. As previously demonstrated,¹¹ especially for heavy smokers, the reduction in or cessation of tobacco smoking before periodontal treatment is crucial for the improvement of periodontitis lesions.

There is substantial biological plausibility to support the relationship between diabetes and the onset and progression of periodontitis.^{23,24} Moreover, the assumption that diabetes is a risk factor for periodontitis has been supported by a range of classic and contemporary clinical studies conducted in diverse populations.^{25,26} In this review, while most studies reported associations between diabetes and periodontitis outcomes,

Table 2. Descriptive analysis of the studies reporting the association between diabetes and periodontitis.

Authors	Country	Study design	Population and sample	Age range	Prior sample size estimation	Diabetes definition	Outcome definition	Other variables	Association of periodontitis with smoking. Effect size [95%IC]	Main findings
López et al. (2001) ²⁰	Chile	Cross-sectional	9,203 students from 98 high schools in the province of Santiago	12–21	Yes	NR	Occurrence of ≥ 2 teeth with interproximal CAL ≥ 1 mm, or ≥ 1 tooth with interproximal CAL ≥ 3 mm	Age, Author gender, tooth brushing frequency, last visit to the dentist, governmental support, smoking	OR - Presence of ≥ 2 teeth with CAL ≥ 1 mm: All sites 1.27 [95%IC: 0.74–2.19] Interproximal sites 1.68 [95%IC: 0.98–2.86] OR - Presence of ≥ 1 teeth with CAL ≥ 3 mm: All sites 1.87 [95%IC: =0.76–4.61] Interproximal sites 1.30 [95%IC: 0.41–4.06]	Diabetic status was not associated with CAL after adjusting for other variables.
Susin et al. (2004) ¹²	Brazil	Cross-sectional	843 subjects >30 years living in the metropolitan Porto Alegre area	30–103	Yes	NR	Percentage of teeth with: Severe CAL: CAL ≥ 5 mm in > 50% of teeth Moderate CAL: CAL ≥ 5 mm in 15% to 50% of teeth Slight or no CAL: below moderate category	Age, gender, race, socioeconomic status, dental visits, smoking	CAL (RRR) Significant higher percentage of teeth with CAL ≥ 3 mm and ≥ 5 mm in patients with DM. RRR - Moderate CAL: Non-diabetic: Reference Diabetic: 1.7 [0.8–3.5] RRR - Severe CAL: Non-diabetic: Reference Diabetic: 3.3 [1.1–10.6]*	Diabetic status was not associated with CAL after adjusting for other variables.

Continue

Continuation

	300 individuals with diabetes from Public health facilities in Belo Horizonte								CAL (PR)	
Silva et al. (2010) ¹⁵	Brazil	Cross-sectional	30–86	Yes	medical diagnosis	Prevalence of periodontitis defined as CAL ≥ 3 mm in ≥ 2 non-adjacent teeth or CAL ≥ 5 mm in 30% of the teeth (EFP; Tonetti & Claffey, 2005).	Gender, age, income, schooling, marital status, missing teeth, dental care, smoking	Periodontitis was significantly more prevalent among participants with type 2 DM.	PR – Prevalence of periodontitis/duration of DM:	More than 8 years duration of DM was associated with periodontitis.
								≤ 8 years: Reference		
								> 8 years:		
								1.63 [1.12–2.38]*		
				</						

*Statistically significant. NR: not reported; CAL: clinical attachment loss; PD: probing depth; OR: odds ratio; RRR: relative risk ratio; PR: prevalence ratio; RR: risk ratio; EFP: European Federation of Periodontology; CDC: Center for Disease Control and Prevention; AAP: American Academy of Periodontology; DM: diabetes mellitus.

unexpectedly, only two found a statistically significant relationship after accounting for confounding factors.^{15,22} However, these findings should be interpreted with caution due to certain methodological aspects of the studies included. These consist of discrepancies in the population ages and methods used to diagnose diabetes, the limited number of prospective studies, and the overall small sample size of participants with diabetes in the studies, which may have reduced the statistical power to observe the real impact of diabetes on periodontitis. Therefore, well-designed population-based prospective studies are still needed for further studies on the association between diabetes and periodontitis in Latin American and Caribbean countries. It is noteworthy that the present review identified only two population-based prospective cohort studies, indicating a gap in longitudinal research within Latin America and the Caribbean. Moreover, the studies were limited to three South American countries (Brazil, Chile, and Colombia), pointing out a need for more extensive research across these regions. Filling these research gaps will offer a more thorough understanding of the association between smoking and diabetes and periodontitis that will be helpful in the development of more effective prevention and treatment approaches in the areas.

Contemporary evidence points out that cessation of exposure to tobacco and diabetes-related lifestyle interventions could significantly reduce the risk of periodontitis.²⁷⁻³¹ Therefore, oral health professionals should be trained in techniques to open the conversation about the use of tobacco products and awareness of blood glucose levels in their clinical practice.³² Considering the proximity of oral health professionals to patients due to multiple visits during the course of their lives, it is important that they feel welcome to discuss smoking-related and diabetes-related themes and that professionals are familiar with the stakeholders themselves and other healthcare professionals who can attend to the patient's needs. For instance, the Very Brief Advice (VBA) is an intervention that all healthcare professionals

can implement in nearly every consultation with smoking patients. It consists of concise, evidence-based recommendations to motivate individuals to quit smoking and directs them to a trained smoking cessation specialist.³³

Universities, dental associations and government agencies should collaborate to advocate for an agenda of investigations into the determinants of periodontal disease in the Latin America and Caribbean region. Furthermore, there should be a collaborative effort to design and implement strategies to train oral health professionals to discuss smoking and diabetes with their patients and how to handle their questions and needs appropriately. Oral healthcare providers must also be aware of the infrastructure available for patient referrals. The involvement of the oral healthcare team in managing individual risk factors may depend on their ability to collaborate with other professionals, such as psychologists, endocrinologists, nurses, and others. These collaborations can be fostered within the academic setting, with the aim of having professionals who advocate for the comprehensive health of the individual. Policies shall support tobacco cessation programs, screening of patients with pre-diabetes, diabetes and improvement of diabetes care in various healthcare segments. Finally, public health campaigns shall also raise awareness about the risks of smoking and poor diabetes control on oral health. All these measures could potentially contribute to reducing the prevalence and progression of periodontitis in Latin America and Caribbean countries.

Acknowledgments

This manuscript was prepared for the consensus titled "Latin America and Caribbean Periodontics Consensus 2024" organized by the Latin American Oral Health Association (LAOHA). The consensus process actively engaged experts from across the region, and the broader community was invited to review and contribute to the content. The resulting Consensus Report was derived from this paper. We would like to acknowledge the Colgate Palmolive Company for their support.

References

1. Peres MA, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. *Lancet*. 2019 Jul;394(10194):249-60. [https://doi.org/10.1016/S0140-6736\(19\)31146-8](https://doi.org/10.1016/S0140-6736(19)31146-8)
2. Watt RG, Daly B, Allison P, Macpherson LM, Venturelli R, Listl S, et al. Ending the neglect of global oral health: time for radical action. *Lancet*. 2019 Jul;394(10194):261-72. [https://doi.org/10.1016/S0140-6736\(19\)31133-X](https://doi.org/10.1016/S0140-6736(19)31133-X)
3. Loos BG, Van Dyke TE. The role of inflammation and genetics in periodontal disease. *Periodontol 2000*. 2020 Jun;83(1):26-39. <https://doi.org/10.1111/prd.12297>
4. Genco RJ, Borgnakke WS. Risk factors for periodontal disease. *Periodontol 2000*. 2013 Jun;62(1):59-94. <https://doi.org/10.1111/j.1600-0757.2012.00457.x>
5. Martínez-Herrera M, Silvestre-Rangil J, Silvestre FJ. Association between obesity and periodontal disease: a systematic review of epidemiological studies and controlled clinical trials. *Med Oral Patol Oral Cir Bucal*. 2017 Nov;22(6):e708-15. <https://doi.org/10.4317/medoral.21786>
6. Decker A, Askar H, Tattan M, Taichman R, Wang HL. The assessment of stress, depression, and inflammation as a collective risk factor for periodontal diseases: a systematic review. *Clin Oral Investig*. 2020 Jan;24(1):1-12. <https://doi.org/10.1007/s00784-019-03089-3>
7. Genco RJ, Borgnakke WS. Diabetes as a potential risk for periodontitis: association studies. *Periodontol 2000*. 2020 Jun;83(1):40-5. <https://doi.org/10.1111/prd.12270>
8. Leite FR, Nascimento GG, Scheutz F, López R. Effect of smoking on periodontitis: a systematic review and meta-regression. *Am J Prev Med*. 2018 Jun;54(6):831-41. <https://doi.org/10.1016/j.amepre.2018.02.014>
9. Papapanou PN, Sanz M, Buduneli N, Dietrich T, Feres M, Fine DH, et al. Periodontitis: Consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol*. 2018 Jun;89(S1 Suppl 1):S173-82. <https://doi.org/10.1002/JPER.17-0721>
10. Sanz M, Herrera D, Kebschull M, Chapple I, Jepsen S, Beglundh T, et al. EFP Workshop Participants and Methodological Consultants. Treatment of stage I-III periodontitis-The EFP S3 level clinical practice guideline. *J Clin Periodontol*. 2020 Jul;47 Suppl 22(Suppl 22):4-60. <https://doi.org/10.1111/jcpe.13290>
11. Leite FR, López R, Pajaniaye JB, Nascimento GG. Effect of smoking exposure on nonsurgical periodontal therapy: 1-year follow-up. *J Dent Res*. 2023 Mar;102(3):280-6. <https://doi.org/10.1177/00220345221135100>
12. Susin C, Dalla Vecchia CF, Oppermann RV, Haugejorden O, Albandar JM. Periodontal attachment loss in an urban population of Brazilian adults: effect of demographic, behavioral, and environmental risk indicators. *J Periodontol*. 2004 Jul;75(7):1033-41. <https://doi.org/10.1902/jop.2004.75.7.1033>
13. Susin C, Albandar JM. Aggressive periodontitis in an urban population in southern Brazil. *J Periodontol*. 2005 Mar;76(3):468-75. <https://doi.org/10.1902/jop.2005.76.3.468>
14. Moimaz SA, Zina LG, Saliba O, Garbin CA. Smoking and periodontal disease: clinical evidence for an association. *Oral Health Prev Dent*. 2009;7(4):369-76.
15. Silva AM, Vargas AM, Ferreira EF, Abreu MH. Periodontitis in individuals with diabetes treated in the public health system of Belo Horizonte, Brazil. *Rev Bras Epidemiol*. 2010 Mar;13(1):118-25. <https://doi.org/10.1590/S1415-790X2010000100011>
16. Frias AC, Antunes JL, Frattucci MV, Zilbovicius C, Junqueira SR, Souza SF, et al. [Population based study on periodontal conditions and socioeconomic determinants in adults in the city of Guarulhos (SP), Brazil, 2006]. *Rev Bras Epidemiol*. 2011 Sep;14(3):495-507. Portuguese. <https://doi.org/10.1590/s1415-790x2011000300014>
17. Susin C, Haas AN, Valle PM, Oppermann RV, Albandar JM. Prevalence and risk indicators for chronic periodontitis in adolescents and young adults in south Brazil. *J Clin Periodontol*. 2011 Apr;38(4):326-33. <https://doi.org/10.1111/j.1600-051X.2011.01699.x>
18. Haas AN, Wagner MC, Oppermann RV, Rösing CK, Albandar JM, Susin C. Risk factors for the progression of periodontal attachment loss: a 5-year population-based study in South Brazil. *J Clin Periodontol*. 2014 Mar;41(3):215-23. <https://doi.org/10.1111/jcpe.12213>
19. Schuch HS, Nascimento GG, Peres KG, Mittinty MN, Demarco FF, Correa MB, et al. The controlled direct effect of early-life socioeconomic position on periodontitis in a birth cohort. *Am J Epidemiol*. 2019 Jun;188(6):1101-8. <https://doi.org/10.1093/aje/kwz054>
20. López R, Fernández O, Jara G, Baelum V. Epidemiology of clinical attachment loss in adolescents. *J Periodontol*. 2001 Dec;72(12):1666-74. <https://doi.org/10.1902/jop.2001.72.12.1666>
21. Gamonal J, Mendoza C, Espinoza I, Muñoz A, Urzúa I, Aranda W, et al. Clinical attachment loss in Chilean adult population: First Chilean National Dental Examination Survey. *J Periodontol*. 2010 Oct;81(10):1403-10. <https://doi.org/10.1902/jop.2010.100148>
22. Serrano C, Suarez E. Prevalence of severe periodontitis in a Colombian adult population. *J Int Acad Periodontol*. 2019 Apr;21(2):53-62.
23. Graves DT, Ding Z, Yang Y. The impact of diabetes on periodontal diseases. *Periodontol 2000*. 2020 Feb;82(1):214-24. <https://doi.org/10.1111/prd.12318>

24. Bitencourt FV, Nascimento GG, Costa SA, Andersen A, Sandbæk A, Leite FR. Co-occurrence of periodontitis and diabetes-related complications. *J Dent Res*. 2023 Sep;102(10):1088-97. <https://doi.org/10.1177/00220345231179897>
25. Chávarry NG, Vettore MV, Sansone C, Sheiham A. The relationship between diabetes mellitus and destructive periodontal disease: a meta-analysis. *Oral Health Prev Dent*. 2009;7(2):107-27.
26. Nascimento GG, Leite FR, Vestergaard P, Scheutz F, López R. Does diabetes increase the risk of periodontitis? A systematic review and meta-regression analysis of longitudinal prospective studies. *Acta Diabetol*. 2018 Jul;55(7):653-67. <https://doi.org/10.1007/s00592-018-1120-4>
27. Rosa EF, Corraini P, Inoue G, Gomes EF, Guglielmetti MR, Sanda SR, et al. Effect of smoking cessation on non-surgical periodontal therapy: results after 24 months. *J Clin Periodontol*. 2014 Dec;41(12):1145-53. <https://doi.org/10.1111/jcpe.12313>
28. Leite FR, Nascimento GG, Baake S, Pedersen LD, Scheutz F, López R. Impact of smoking cessation on periodontitis: a systematic review and meta-analysis of prospective longitudinal observational and interventional studies. *Nicotine Tob Res*. 2019 Nov;21(12):1600-8. <https://doi.org/10.1093/ntr/nty147>
29. Saengtipbovorn S, Taneepanichskul S. Effectiveness of lifestyle change plus dental care program in improving glycemic and periodontal status in aging patients with diabetes: a cluster, randomized, controlled trial. *J Periodontol*. 2015 Apr;86(4):507-15. <https://doi.org/10.1902/jop.2015.140563>
30. Nishihara U, Tanabe N, Nakamura T, Okada Y, Nishida T, Akihara S. A periodontal disease care program for patients with type 2 diabetes: A randomized controlled trial. *J Gen Fam Med*. 2017 Apr;18(5):249-57. <https://doi.org/10.1002/igf2.58>
31. Mizutani K, Minami I, Mikami R, Kido D, Takeda K, Nakagawa K, et al. Improvement of periodontal parameters following intensive diabetes care and supragingival dental prophylaxis in patients with type 2 diabetes: a prospective cohort study. *J Clin Periodontol*. 2024 Jun;51(6):733-41. <https://doi.org/10.1111/jcpe.13958>
32. Ramseier CA, Woelber JP, Kitzmann J, Detzen L, Carra MC, Bouchard P. Impact of risk factor control interventions for smoking cessation and promotion of healthy lifestyles in patients with periodontitis: a systematic review. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):90-106. <https://doi.org/10.1111/jcpe.13240>
33. Papadakis S, McEwen A. Very brief advice on smoking PLUS (VBA+). Dorset: National Centre for Smoking Cessation and Training; 2021.

Periodontal disease and its impact on general health in Latin America – Diagnosis: Latin America and the Caribbean Consensus 2024

Cassiano Kuchenbecker RÖSING^(a) 
Juliano CAVAGNI^(a) 
Gerson Pedro José LANGA^(b) 
Willy BUSTILLOS TORREZ^(c) 
Juan Antonio CEPEDA BRAVO^(d) 

^(a)Universidade Federal do Rio Grande do Sul – UFRGS, School of Dentistry, Department of Periodontology, Porto Alegre, RS, Brazil.

^(b)Instituto Superior de Ciência e Tecnologia de Moçambique – ISCTEM, Maputo, Mozambique

^(c)Universidad Privada Franz Tamayo (UNIFRANZ), Research department, Bolivia.

^(d)Universidad Autónoma de San Luis Potosí, Facultad de Estomatología, Department of Periodontology, San Luis Potosí, Mexico.

Declaration of Interests: The authors certify that they have no commercial or associative interest that represents a conflict of interest in connection with the manuscript.

Corresponding Author:
Juliano Cavagni
E-mail: jcavagni@hotmail.com

Abstract: This is a new version of the LAOHA Consensus on Periodontal Disease and its impact on general health in Latin America. Five years after the first version, knowledge has increased, and diagnosis of periodontal disease has evolved. Of especial interest relative to this topic has been the emergence of studies that have used the AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions since it is the core (?) of the art of diagnosis in preventive and therapeutic strategies. To make an accurate and effective diagnosis, knowledge about the health-disease process is fundamental. This article updates and demonstrates challenges in periodontal diagnosis, especially in Latin American countries. Considering that periodontal diagnosis should be based on knowledge of the etiopathogenesis of periodontal diseases, this article points out aspects developed in the last few years and emphasizes the knowledge that has been established, considering diagnosis of periodontal diseases. The evidence available stresses the importance of interviewing the patient, by implementing periodontal charting, and requesting any imaging and other complementary tests necessary. An important observation is that the partial periodontal data recordings used for screening (up to now) are not diagnostic methods and might underestimate disease. Moreover, in this article approaches to other forms of recognizing periodontal diseases are described, which could be used, however, not for the purpose of diagnosis, but for increasing awareness and eventually for referring individuals. In Latin American countries there is a need to increase the awareness of periodontal diseases among both the population and the profession, with particular emphasis on prioritizing correct periodontal diagnosis. In Dental education, strategies need to be established with the purpose of understanding that diagnosis is pivotal to any clinical approach.

Keywords: Diagnosis; Periodontal Diseases; Latin America.

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0119>

Introduction

In 2019, the Latin American Oral Health Association held a Consensus Meeting with representatives of several countries and representative Scientific Associations, which generated important publications for

Submitted: 2024, July 31
Accepted for publication: August 1, 2024
Last revision: September 19, 2024

the region, in an endeavor to address the impact of periodontal diseases in Latin America. After 5 years, a new Consensus is warranted, since knowledge has evolved considerably. The section about diagnosis, which is of interest to the present article, was published by Rösing et al.,¹ after the participants in the Consensus Meeting had made their contributions. The present article updates and offers new insights into the previously published Consensus Report. It is a narrative review, performed after an extensive and systematic search related to periodontal diagnosis.

Diagnosis of periodontal diseases and conditions has been the subject of a series of controversies that led to difficulties in communication, and especially related to different clinical approaches in Dentistry. In the Glossary of Periodontal Terms of the American Academy of Periodontology, periodontal diagnosis has been defined as “The process (or opinion derived from the process) of identifying the nature and cause of a disease of the periodontium; relevant information used in this process typically includes medical and dental histories, clinical and radiographic examination of the patient, and laboratory findings”.² The art of diagnosis should be considered above any classification system which, per se, is an arbitrary way of distinguishing different forms of disease and conditions. However, classification systems might shed light on the possibility of communication. This article approaches the diagnosis of the periodontal health/disease process, in an endeavor to understand its challenges, and to propose possible solutions, especially for Latin American countries. The article will be publicly evaluated before its final version and contributions will be included in the article.

Historically, Dentistry has focused mainly on dental caries since this is still the major cause of tooth loss, pain, and impairment of oral health. This focus led to underdiagnosis of periodontal diseases and other oral conditions. The decline in estimates of dental caries occurrence, and understanding of the importance of more comprehensive oral care, has led to the understanding that periodontal diseases need to be looked upon with more attention,

from a health perspective of both individuals and populations. This is supported by evidence of the role of periodontal diseases in oral outcomes e.g. tooth loss, as well as possible relations with other systemic conditions and oral health-related quality of life.³⁻⁵ Studies have demonstrated that routine periodontal diagnosis has not been performed as would be expected. This is probably related to the specificities in periodontal diagnosis as well as a reflection of dental education still mainly focused on dental caries and its consequences.^{4,6} Furthermore, an important fact is that health systems do not value periodontal diagnosis and treatment as they should.

Diagnosis of the periodontal health/disease process

It is important to recognize that diagnosis of the periodontal health/disease process differs completely in epidemiological and clinical settings. Epidemiological surveys describe the occurrence of states of health and disease in populations, associating them with possible risk factors/indicators. In this sense, epidemiological studies are not focused on individual diagnosis. Moreover, notably epidemiological studies use cut-off points that are not always the outcomes most used in clinical settings. There is a misunderstanding about the role of epidemiological studies that leads to misinterpretation of periodontal disease diagnoses. Outcomes in epidemiological surveys are arbitrarily posed especially related to the main objectives of the study. Several surveys have been reported in different articles with distinct primary outcome cut-off points. Data from epidemiological studies will be used to build the knowledge that will guide the process of individual diagnosis.^{7,8}

As stated in the definition of periodontal diagnosis, from an individual perspective, it should be focused on the person as a whole, combined with information not only derived from the clinical examination.² For this reason, the vision of an individual diagnosis based on local and systemic conditions and risk factors of each patient must be an exercise that leads to the best treatment strategy. Moreover, there is one point of consensus: periodontal disease cannot be

diagnosed after the tooth is about to be lost due to periodontal breakdown! This is lack of responsibility of the professional(?), who seems to underdiagnose periodontal diseases.

Periodontal diseases have been classified in different ways. The point that needs to be reinforced is that the periodontal health/disease process clinically manifests in two main types of impairment: gingivitis and periodontitis. The distinction between these two diseases is mainly based on the concomitant occurrence of loss of attachment. Gingivitis is an inflammatory process triggered by the presence of supragingival biofilm and is not associated with loss of the periodontal apparatus. Periodontitis occurs after imbalance between the presence of subgingival biofilm and the host response, leading to loss of periodontal attachment and bone. It is well recognized that in its causal chain, periodontitis has important risk factors that should be emphasized in prevention, diagnosis and treatment. Since both diseases have a background of an inflammatory process, diagnosis should include these aspects in the interview with the patient, in the physical examination, and with additional diagnostic tests that could help in the diagnosis.^{9,10}

In 2018, a Joint Workshop hosted by both the European Federation of Periodontology and the American Academy of Periodontology launched a new classification system for periodontal and peri-implant diseases and conditions. An impressive effort was made to improve the existing classification systems.¹⁰ Professionals usually require a learning curve to enable the new classification system to be adopted worldwide. The system comprises gingival health, gingivitis, periodontitis and peri-implant diseases and conditions. After more than 5 years, the dental profession has used the system and continues in the learning curve.⁸ But it should be understood that the AAP/EFP system is no longer new and suffices for an evidence-based diagnosis of periodontal diseases.⁷ The system is based on the best available evidence, however, in some situations low-level evidence had to be used. An extremely important aspect to understand is that the classification system was not meant to be a priority for epidemiology or research,

but was meant for individual diagnosis. Of course, it needs to be understood that the extensive study conducted in the literature should be the basis for epidemiological and research purposes, without the need for complete standardization between these two activities. This article acknowledges that a part of the system was dedicated to defining gingival health - from pristine gingival health to clinically healthy gingiva. In addition, this article points out that periodontitis was mainly classified into stages and grades. This system allows the understanding that in each patient, both rate of progression and the way the function is affected, accounts for tooth loss, for example.¹⁰

It is also of interest to mention that in 2019 an important paper was published alerting dental professionals about the importance of ending the neglect of global oral health, and suggesting radical action. This included comprehension of the broad spectrum of pathogenesis of the disease process and, of course, devising an amplified strategy for diagnosis and prevention.¹¹

Periodontal diagnosis in practice

This article emphasizes the importance of general practitioners and specialists being well trained in diagnostic capabilities. Specialists should also dedicate time to more in depth examination of complex cases.⁷ Furthermore, although this article has focused on periodontal diagnosis, it is mandatory for dentists to be proficient in oral health diagnosis. For example, root caries is a very frequent situation in periodontal individuals, and it should not be underdiagnosed. It should be borne in mind that before being a specialist in any area of Dentistry, professionals are general dentists and therefore, diagnosis should not be considered part of specialized care.¹²

The interview with the patient is of utmost importance in periodontal diagnosis. This is a challenge to the professional, since a comprehensive interview is one of the keys of diagnosis of all conditions, including periodontal diseases. It is noteworthy that simply reading even validated questionnaires might not be enough to collect data from a suffering individual. In terms of other systemic conditions since over 50

conditions have been associated with the occurrence of periodontal diseases, ranging from hormonal changes, exposure to environmental factors through to rare syndromes.^{9,10} Professionals need to have this knowledge and incorporate it into the interview with the patient. Moreover, since periodontal diseases are linked to behavioral components including oral hygiene methods, these should be part of the diagnostic process. The interview with the patient is also part of the treatment. For example, motivational interview strategies are used both in diagnosis as in clinical management of chronic diseases.¹³⁻¹⁵

The physical examination should consider the understanding that periodontal diseases are of a chronic nature. The progression of untreated periodontitis is known to be slow, therefore limiting rapid clinical impact.¹⁶ In this sense, periodontal physical examination still is based on the history of disease. In addition, the presence of inflammatory signs is of utmost importance in diagnosis of periodontal diseases. Therefore, the diagnostic tool most used is periodontal probing, for the purpose of understanding both the inflammatory status (*e.g.* with probing depth or bleeding on probing) or the history of disease (with loss of attachment). This is also one of the best tools for monitoring progression of disease over time.¹⁷ Considering the foregoing information, it is a consensus that in some way, every dentist needs to perform periodontal probing in every patient. This is one of the challenges of periodontal diagnosis, since there is a perverse understanding that periodontal diagnosis is for specialists.¹

The AAP/EFP classification system calls for probing attachment loss to enable better diagnosis of periodontitis.¹⁰ Of course, for epidemiological reasons, periodontal probing to obtain the history of disease progression should be performed mainly in adult individuals. Children should be periodontally diagnosed with probing and/or radiographs if they have family history of periodontal disease. On the other hand, measurements for detection of gingival inflammation are needed from childhood.^{18,19}

Periodontal probing is known to be time consuming and laborious and this is one of the reasons why it has not been as widely used as expected. This article urges that dental training must reinforce the importance of

using this tool to increase the quality of oral diagnosis.¹⁰ Reports have been observed about different types of probes (manual vs. automatized/computerized).¹⁷ Therefore, practitioners are encouraged to use any type of probe. The gold standard for periodontal diagnosis is full mouth periodontal examination, *i.e.* periodontal probing in six sites per tooth (disto-buccal, mid-buccal, mesio-buccal, disto-palatal/lingual, mid-palatal/lingual, mesio-palatal/lingual). When this approach is adopted, there are few chances of misdiagnosis of periodontal diseases.^{20,21} However, other simplified approaches have been proposed in an attempt to increase the number of dentists routinely performing periodontal examinations.⁶

When accepting the challenges and difficulties of proper periodontal diagnosis, it should be remembered that other strategies (not for diagnosis) could be used. In this sense, one could propose different terms such as recognition, awareness, detection, screening, etc. could be used. For decades, Dentistry has searched for simplified periodontal diagnostic tools without success. However, the information given by this extensive work should not be disregarded. However, we repeat that diagnosis cannot be derived from these tools.

For example, it should be borne in mind that screening is the main aim of any type of partial examination, thus, if periodontal disease is found by means of this approach, complete periodontal charting is mandatory. Susin *et al.*²² tested 7 partial recording protocols based both on full mouth and in half mouth examinations and observed that all partial examination protocols underestimated the occurrence of periodontal disease. The best partial recording protocol found in this study was probing 3 sites per tooth (mesio-buccal, mid-buccal and disto-lingual). Nevertheless, this is still time consuming. The more severe the disease is, the worse partial recording for periodontal diagnosis will be. Therefore, the recommendation is that if an individual has periodontitis, full-mouth periodontal probing must be performed.

An alternative has been proposed for periodontal screening; that is the so called basic periodontal examination (periodontal screening and recording).⁶ This examination is based on probing all the teeth and

scoring the sextant according to probing depth. When deeper probing depths are observed, a full-mouth periodontal examination is recommended. This is an interesting alternative, for those who understand that periodontal charting is not necessary. With this tool, it should be stressed that underestimation of periodontal diagnosis is a reality. On the other hand, if this were the only alternative considered for periodontal diagnosis, this would allow screening of more severe cases. Screening is an effective way of covering a larger number of the population. In different settings, this should be subject to discussion. The premise is that “doing something is better than doing nothing”. This is partially true, especially in individual situations. It should be re-emphasized that screening is not diagnosis.

Several studies have been conducted in the last years with the AAP/EFP classification system. These studies included epidemiological surveys and clinical studies. It should be borne in mind that it is only possible and feasible to use the AAP/EFP classification together with complete periodontal charting.^{8,10}

In addition to interviewing the patient and performing periodontal physical examination, additional diagnostic tests are available. Image tests are the most used in terms of periodontal diagnosis. However, considering the international guidelines for radioprotection, they should be preceded by clinical indication, i.e. data from either the interview with the patient or from the physical examination are the core factors for indicating imaging examinations. The most common image tests used in periodontal diagnosis are periapical and panoramic radiographs, and more contemporarily, the cone-beam computed tomography (CBCT). All of them expose the individual to x-rays and therefore need to be limited. This article recommends that the practitioners must be aware of the international guidelines for radioprotection before indicating such examinations.²³ The AAP/EFP classification system clearly uses information of past disease by means of image tests. This is important for standardizing periodontal diagnosis, however, as previously stated, should follow radioprotection guidelines.

The panoramic radiograph is one of the most cost-effective images, however, in cases of periodontal

breakdown, it offers limited image detail. Therefore, in cases of moderate disease, complementation with selected periapical or vertical bitewing images is warranted, and in cases of severe periodontal disease, a complete periapical radiographic examination could be necessary. The use of CBCT is restricted to specific periodontal situations, including endo-perio relationships, fractures, perforations, etc.^{24,25}

The most important aspect of image tests is that they are comprehensively analyzed, in order to yield a better diagnosis. In the specific case of periodontal diseases, the bone crest deserves special attention, both in terms of the presence of lamina dura (which might be indication of periodontal stability), and the amount of lost periodontal bone, especially for future analyses of disease progression. The advice is to exercise caution when emphasizing the presence of lamina dura, as its visibility can also be influenced by the angle of X-ray projection.

Sophisticated diagnostic methods have been proposed in the literature, including microbiological, immunological, physical, molecular assays.^{26,27} These methods have been extensively used in research. However, for the clinical approach, they have not proved to be necessary up to now. Whereas the desire is that more accurate diagnostic tools will be developed in the future, since the available tools are still based on probing, which is rudimentary and could be replaced by a more precise device. In terms of diagnosis of periodontal diseases, it should be borne in mind that the sophisticated tools are not and do not have to be routinely used.

Furthermore considering the complexity of periodontal disease, it is not possible to think of the diagnosis of periodontal diseases outside the concept of integral care, which includes additional tests (glycated hemoglobin data in diabetic individuals, or the aid of other blood tests in systemically compromised individuals); in addition to this, however, the professional should remember that to take care of a human being during the clinical examination since it is necessary to consider aspects such as: life history, family dynamics, exposure to risk factors, social aspects and psychology.

Contemporarily, self-report measurements of periodontal diseases, either combined with some

clinical assessment, or not have been developed. They have been tested and validated against the gold standard, which is complete periodontal charting, in addition to the interview with the patient and additional imaging exams²⁸ Although they might have been validated, they should not be used for diagnosis of periodontal diseases. These tools are not meant for diagnosis, but they shed some light in terms of increasing awareness, recognition of disease and referral to a dental professional. There are several examples with use of these types of tools. The Periodontal Risk Assessment (PRA)²⁹ is a system that uses clinical data, together with information from the patient in order to establish risk and to suggest some clinical approaches. The Gingival Health Test is an internet-based questionnaire that is meant to increase awareness of periodontal diseases. However, it is not meant at all for diagnosis.³⁰

Goals for Latin America: concluding remarks

This section reviewed the key aspects of periodontal diagnosis, in an evidence-based approach, in an endeavor to summarize the state of the art, and taking into consideration the characteristics of the dental profession in Latin American countries. These countries have experienced continuous development in oral health care. The efforts in preventing and treating periodontal diseases still have not produced tangible effects in the region. The prevalence of periodontal diseases is still high, and a burden of disease is observed across Latin-American countries. In addition, differences in, cultural and socioeconomic characteristics are common in the area, which call for specific approaches. With the aim of increasing the quality of the profession even further, the following aspects should be considered:

- a. A call for action is necessary to increase awareness of periodontal diseases to enhance the quality of oral health care and proper maintenance of teeth throughout the patient's life;
- b. Dental professionals should be trained right from the undergraduate curriculum to appropriately diagnose periodontal diseases and to successfully achieve prevention of periodontal diseases;
- c. Dental professionals need to increase awareness in the community about periodontal diseases. Therefore, the information that gingival bleeding is not normal, and that other characteristics of periodontal diseases such as tooth spacing or mobility might be signs of periodontal disease, etc. should be spread.
The use of self-reported periodontal awareness tools should be emphasized (based on the high prevalence of gingivitis and periodontitis in the Latin American community). It should be mandatory to emphasize periodontal diagnostic maneuvers regardless of the patient's reason for consultation.
The definition that periodontal diagnosis needs complete periodontal charting needs to be spread. Other types of examination do not achieve diagnosis and are only useful for screening/recognition. Underdiagnosis needs to be avoided.
- a. Dental practitioners should be aware of systemic and behavioral aspects that are linked to periodontal diseases and include them in the interview with the patient; they must be able to work at a multidisciplinary level in cases in which this is required to accomplish overall health;
- b. Oral health professionals should routinely perform periodontal clinical examination, according to the level of disease of the patient;
- c. Additional diagnostic tests should be understood as being part of periodontal diagnosis and practitioners should know how to use them to obtain their best diagnostic yield;
- d. Dental professionals should understand the periodontal health/disease process to enable them to approach it correctly, either by themselves or to refer their patients to obtain a proper approach to treatment;
- e. The evolution of periodontal diagnosis and awareness needs to be continuously evaluated and under surveillance in the Latin American region, in order to increase the quality of practicing dentists.
Dental education needs to include more in depth periodontal diagnosis methodology(?) at all levels of healthcare.

References

1. Rösing CK, Cavagni J, Malheiros Z, Stewart B, Aránguis Freyhofer V. Periodontal disease and its impact on general health in Latin America. Section IV: Diagnosis. *Braz Oral Res.* 2020 Apr 9;34(suppl 1):e022. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0022>
2. American Academy of Periodontology. Glossary of periodontal terms. Chicago; 2024 [cited 2024 March 19]. Available from: <https://members.perio.org/libraries/glossary?ssopc=1>
3. Cardoso EM, Reis C, Manzanares-Céspedes MC. Chronic periodontitis, inflammatory cytokines, and interrelationship with other chronic diseases. *Postgrad Med.* 2018 Jan;130(1):98-104. <https://doi.org/10.1080/00325481.2018.1396876>
4. Haag DG, Peres KG, Balasubramanian M, Brennan DS. Oral conditions and health-related quality of life: a systematic review. *J Dent Res.* 2017 Jul;96(8):864-74. <https://doi.org/10.1177/0022034517709737>
5. Sanz M, Ceriello A, Buysschaert M, Chapple I, Demmer RT, Graziani F, et al. Scientific evidence on the links between periodontal diseases and diabetes: consensus report and guidelines of the joint workshop on periodontal diseases and diabetes by the International Diabetes Federation and the European Federation of Periodontology. *J Clin Periodontol.* 2018 Feb;45(2):138-49. <https://doi.org/10.1111/jcpe.12808>
6. Preshaw PM. Detection and diagnosis of periodontal conditions amenable to prevention. *BMC Oral Health.* 2015;15(Suppl 1 Suppl 1):S5. <https://doi.org/10.1186/1472-6831-15-S1-S5>
7. Ke L, Nogueira G, Thomson WM. Influence of case definitions on epidemiological estimates of periodontitis prevalence and its associations with smoking and OHRQoL. *Community Dent Oral Epidemiol.* 2023 Apr;51(2):194-200. <https://doi.org/10.1111/cdoe.12726>
8. Holtfreter B, Kuhr K, Borof K, Tonetti MS, Sanz M, Kornman K, et al. ACES: A new framework for the application of the 2018 periodontal status classification scheme to epidemiological survey data. *J Clin Periodontol.* 2024 May;51(5):512-21. <https://doi.org/10.1111/jcpe.13965>
9. Armitage GC. Development of a classification system for periodontal diseases and conditions. *Ann Periodontol.* 1999 Dec;4(1):1-6. <https://doi.org/10.1902/annals.1999.4.1.1>
10. Caton JG, Armitage G, Berglundh T, Chapple IL, Jepsen S, Kornman KS, et al. A new classification scheme for periodontal and peri-implant diseases and conditions - Introduction and key changes from the 1999 classification. *J Periodontol.* 2018 Jun;89(S1 Suppl 1):S1-8. <https://doi.org/10.1002/JPER.18-0157>
11. Watt RG, Daly B, Allison P, Macpherson LM, Venturelli R, Listl S, et al. Ending the neglect of global oral health: time for radical action. *Lancet.* 2019 Jul;394(10194):261-72. [https://doi.org/10.1016/S0140-6736\(19\)31133-X](https://doi.org/10.1016/S0140-6736(19)31133-X)
12. Hugo FN, Kassebaum NJ, Marcenes W, Bernabé E. Role of dentistry in global health: challenges and research priorities. *J Dent Res.* 2021 Jul;100(7):681-5. <https://doi.org/10.1177/0022034521992011>
13. Kopp SL, Ramseier CA, Ratka-Krüger P, Woelber JP. Motivational interviewing as an adjunct to periodontal therapy-a systematic review. *Front Psychol.* 2017 Feb;8:279. <https://doi.org/10.3389/fpsyg.2017.00279>
14. Stenman J, Wennström JL, Abrahamsson KH. A brief motivational interviewing as an adjunct to periodontal therapy-A potential tool to reduce relapse in oral hygiene behaviours: a three-year study. *Int J Dent Hyg.* 2018 May;16(2):298-304. <https://doi.org/10.1111/idh.12308>
15. Gillam DG, Yusuf H. Brief motivational interviewing in dental practice. *Dent J.* 2019 May;7(2):51. <https://doi.org/10.3390/dj7020051>
16. Teles R, Moss K, Preisser JS, Genco R, Giannobile WV, Corby P, et al. Patterns of periodontal disease progression based on linear mixed models of clinical attachment loss. *J Clin Periodontol.* 2018 Jan;45(1):15-25. <https://doi.org/10.1111/jcpe.12827>
17. Donos N. The periodontal pocket. *Periodontol 2000.* 2018 Feb;76(1):7-15. <https://doi.org/10.1111/prd.12203>
18. Medina-Vega M, Ibarra MC, Quezada-Conde MD, Reis IN, Frias AC, Raggio DP, et al. Periodontal status among 12-year-old schoolchildren: a population-based cross-sectional study in Quito, Ecuador. *Braz Oral Res.* 2024 Jan;38:e002. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0002>
19. Botero JE, Rösing CK, Duque A, Jaramillo A, Contreras A. Periodontal disease in children and adolescents of Latin America. *Periodontol 2000.* 2015 Feb;67(1):34-57. <https://doi.org/10.1111/prd.12072>
20. Kingman A, Susin C, Albandar JM. Effect of partial recording protocols on severity estimates of periodontal disease. *J Clin Periodontol.* 2008 Aug;35(8):659-67. <https://doi.org/10.1111/j.1600-051X.2008.01243.x>
21. Silva-Boghossian CM, Amaral CS, Maia LC, Luiz RR, Colombo AP. Manual and electronic probing of the periodontal attachment level in untreated periodontitis: a systematic review. *J Dent.* 2008 Aug;36(8):651-7. <https://doi.org/10.1016/j.jdent.2008.04.015>
22. Susin C, Kingman A, Albandar JM. Effect of partial recording protocols on estimates of prevalence of periodontal disease. *J Periodontol.* 2005 Feb;76(2):262-7. <https://doi.org/10.1902/jop.2005.76.2.262>
23. Dula K, Benic GI, Bornstein M, Dagassan-Berndt D, Filippi A, Hicklin S, et al. SADMFR Guidelines for the use of cone-beam computed tomography/digital volume tomography. *Swiss Dent J.* 2015;125(9):945-53. <https://doi.org/10.61872/sdj-2015-09-01>

24. Tugnait A, Carmichael F. Use of radiographs in the diagnosis of periodontal disease. *Dental update*. 2005;32(9):536-8, 41-2. <https://doi.org/10.12968/denu.2005.32.9.536>
25. Ismail A, Al Yafi F. The role of radiographic imaging in the diagnosis and management of periodontal and peri-implant diseases. *Dent Clin North Am*. 2024 Apr;68(2):247-58. <https://doi.org/10.1016/j.cden.2023.09.002>
26. Armitage GC. Learned and unlearned concepts in periodontal diagnostics: a 50-year perspective. *Periodontol* 2000. 2013 Jun;62(1):20-36. <https://doi.org/10.1111/prd.12006>
27. Kikuchi T, Hayashi JI, Mitani A. Next-generation examination, diagnosis, and personalized medicine in periodontal disease. *J Pers Med*. 2022 Oct;12(10):1743. <https://doi.org/10.3390/jpm12101743>
28. Cyrino RM, Miranda Cota LO, Pereira Lages EJ, Bastos Lages EM, Costa FO. Evaluation of self-reported measures for prediction of periodontitis in a sample of Brazilians. *J Periodontol*. 2011 Dec;82(12):1693-704. <https://doi.org/10.1902/jop.2011.110015>
29. Lang NP, Tonetti MS. Periodontal risk assessment (PRA) for patients in supportive periodontal therapy (SPT). *Oral Health Prev Dent*. 2003;1(1):7-16.
30. Duque A, Benítez-Silva CG, Rösing CK. Development of an application and proposal of recommendations to increase awareness of periodontal diseases for patients: concepts, rationale, and use. *J Int Acad Periodontol*. 2023;25(2):116-26. <https://doi.org/10.14436/1466-2094.25.2.102-112.oar>

Strategies for the prevention of periodontal disease and its impact on general health: Latin America and the Caribbean Consensus 2024

Andres DUQUE DUQUE^(a) 
Alejandra CHAPARRO PADILLA^(b) 
Mariana Linhares ALMEIDA^(c) 
Rubiel Antonio MARÍN JARAMILLO^(a) 
Hugo Jorge ROMANELLI^(d) 
Gloria Inés LAFAURIE VILLAMIL^(e) 

^(a)CES University, School of Dentistry, Department of Periodontics, Medellín, Colombia.

^(b)Universidad de Los Andes, Facultad Filosofía y Humanidades, Department of Dentistry, Santiago, Chile

^(c)Faculdade de Enfermagem Nova Esperança, Mossoró, RN, Brazil.

^(d)Maimonides University, Faculty of Health Sciences, Department of Periodontics, Buenos Aires, Argentina.

^(e)Universidad El Bosque, School of Dentistry, Unit of Basic Oral Investigation, Bogotá, Colombia.

Declaration of Interests: The authors certify that they have no commercial or associative interest that represents a conflict of interest in connection with the manuscript.

Corresponding Author:
Gloria Inés Lafaurie Villamil
E-mail: institutouibo@gmail.com

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0120>

Abstract: Periodontal diseases are closely related to non-communicable diseases, and their prevention depends on their link with healthy lifestyle programs. The purpose of this consensus was to summarize and propose preventive strategies at the community, individual, and research levels in Latin America and the Caribbean. A critical review and search strategy was carried out in Pubmed, LILACS, and SCIELO on three topics: a) Social determinants, risk factors, and behavioral changes related to PD throughout the lives of individuals; b) Impact of mechanical and chemical control of plaque for the prevention of gingivitis; c) Impact on prevention of systemic diseases. Relative to public health policies, no consensus was reported in the region. In some countries, periodontal educational strategies, mainly for pregnant women and for other chronic diseases have been implemented, but their impact on primary and secondary prevention has hardly been evaluated. In recent years, a positive aspect has been the implementation of some public policies, including clinical practice guidelines and care pathways. Based on the latest consensus, multicenter educational research and technological strategies were found in the region, but their effectiveness needs to be evaluated in clinical studies. A barrier to the implementation of preventive strategies has to do with the human factor. Therefore, the training of periodontists to be experts in communication strategies, technologies that allow the empowerment of patients for taking care of their periodontal health are required. Moreover, it is necessary to train professionals from other areas of health, who are more aware of the importance of oral health as a healthy lifestyle.

Keywords: Periodontal Diseases; Public Health; Latin America; Caribbean Region.

Introduction

Periodontal diseases (PD) are inflammatory by nature, and are influenced by host factors, dysbiotic biofilm, in addition to being closely related to non-communicable diseases (NCDs) and other risk factors.

Submitted: August 5, 2024
Accepted for publication: August 6, 2024
Last revision: August 22, 2024

By 2030, the FDI's vision is that oral health data will be integrated into medical data management systems.¹ Therefore, preventive strategies and recommendations must address the effects of both inflammation, infection, as well as identify predisposing and modifying factors relative to their onset and progression.² In 2020, the Latin American (LATAM) and Caribbean periodontal Consensus, organized by the Latin American Oral Health Association (LAOHA), proposed a regional plan for the prevention of PD at both the individual and community levels. At that time, recommendations for preventing PD included a focus not only on the mechanical and chemical control of the biofilm but also on modifiable risk factors within the causal chain throughout the health-disease process.^{3,4}

In PD, primary prevention refers to a preclinical stage to prevent the onset of the disease by reducing the risk factors of biofilm development and gingival inflammation. Secondary prevention concerns properly managing the disease at an early stage, based on timely diagnosis and prompt treatment.³ In LATAM and Caribbean countries, where a large part of the population has low and middle income, limited access to health services, and lack of knowledge about diseases and their prevention, the actions taken to reduce the impact of these diseases are especially relevant. In the region, efforts have been made relative to these actions, however, it is necessary to transfer these findings into daily public and private practice and generate new oral health policies focused on preventive strategies. The purpose of this consensus was to propose community, individual, and research strategies for the prevention of PD and its impact on general health, thereby promoting healthy habits from childhood through to the elderly population, based on three topics: a) Social determinants, risk factors, and behavioral changes related to PD throughout the individuals' life-course; b) Impact of mechanical and chemical control of plaque and bleeding on the prevention of gingivitis; c) Preventive impact of controlling systemic diseases (SD) and related conditions.

Methods

A search strategy was conducted in Pubmed by using MESH terms, in LILACS and SCIELO using DECS terms to identify studies on PD prevention. The search strategy was as follow: ("Hispanic or Latino"[Mesh] OR "Caribbean Hispanic people" [Supplementary Concept]) AND "Periodontal Diseases"[Mesh]) AND "prevention and control" [Subheading]. A manual search strategy was also carried out specifying the name of each Latin American a Caribbean country. Systematic reviews (SR), cross-sectional and analytical studies and until December 2023 were included, without language restriction. Documents on health policies of each country and the region were reviewed. The opinions and recommendations of experts were considered for the recommendations and regional action plan. The articles were selected using title and abstract screening. All eligible studies were read in full text and were considered by all authors for citation within the final text.

Evidence and recommendations on social determinants, risk factors and behavioral changes regarding PD over the life course of individuals lives

Evidence of public and private policies on periodontal prevention in Latin America and the Caribbean (community level)

The WHO Commission on Social Determinants of Health emphasized the importance of socioeconomic, political, and environmental factors of health: the circumstances in which people are born, grow, live, work, and age. The LATAM and Caribbean population is diverse in terms of sociodemographic determinants, economic and social inequality, and exposure to risk factors and systemic conditions. These circumstances determine the behaviors that people adopt and the possibilities of modifying habits. Few community strategies have integrated periodontal prevention into their daily public and private practice according to conditions of

inequality, income, educational level, and access to health services.

Community preventive strategies for PD should not be isolated from health programs with the aim of establishing healthy lifestyles. Due to its status as a low-grade inflammatory disease, it should be considered, especially in more vulnerable populations. Therefore, community strategies public and private health systems need to provide community strategies that involve oral health in risk control programs for cardiovascular and metabolic diseases, pregnant women, etc. Furthermore the prevention of PD should be integrated into the strategies for promoting and communicating information on acquiring healthy lifestyles, such reducing tobacco consumption, adopting healthy nutrition, physical exercise, improvement in sleep, moderate alcohol consumption, and strategies to manage stress⁵ (Figure 1) Most experts believe that state public and private health policies should not only be maintained, but they should also be improved. Government and private entities, scientific associations and universities should act together to improve the periodontal health and well-being of the population. Strategic alliances with Dental Product Companies are necessary to achieve the Distribution of free or affordable oral hygiene products to underprivileged areas.

Role of scientific associations and universities in the primary prevention of periodontal diseases (community/individual level and recommendations for research)

Providing optimal periodontal health represents a challenge to the dental profession, scientific associations, and dental education institutions. The Iberoamerican Federation of Periodontology (FIPP) held a Latin American consensus, using Delphi Methodology, with experts from 16 countries to discuss trends in Periodontics for the year 2030.⁶ As regards public health policies and frequency of prevention and treatment procedures performed in periodontics in the public sector, no consensus was found. "Oral hygiene" achieved a moderate consensus. However, no consensus was reached regarding the use of interdental brushes. Nevertheless, experts considered that the recommendation of other

interdental cleaning devices will increase (71.6%). There was a consensus on the significant systemic connection with PDs and the need for collaboration between doctors and dentists. In contrast, there was no consensus relative to the role of public health in periodontal diseases, which may reflect differences in the public health systems of participating countries. Most experts believe that state public health policies should be maintained, but continue to see the need to increase not only prevention activities by the private sector, but also increase e/efforts to raise awareness about PDs.

A communication strategy on social networks among health professionals reported an increase in interest of over 90% in topics, such as: the importance of oral health as a healthy lifestyle, recognition of risk factors shared with chronic non-communicable diseases and importance of periodontal care to benefit systemic health.⁷ An Manifesto by LAOHA in conjunction with FIPP promoted the dissemination of content on social networks ,directed towards health professionals and patients, on early signs of PD, self-care, strategies for controlling CRF with other NCDs and the connection with SD.⁸ An online application initiative (*perio-awareness*) was published to promote awareness about the prevention of PD.

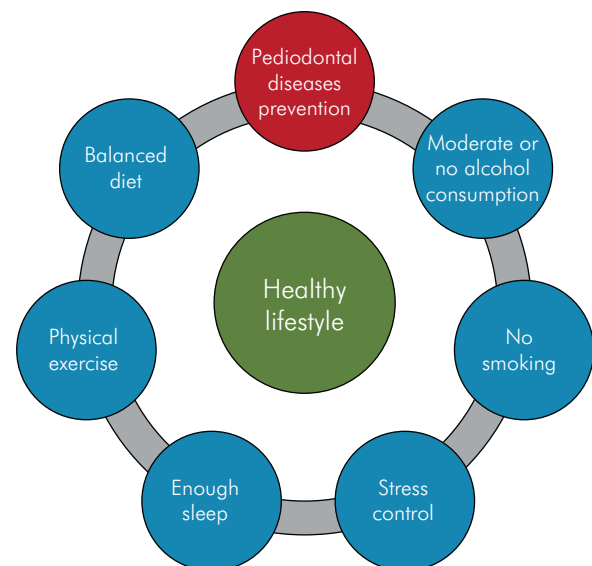


Figure 1. Healthy lifestyle goals, with the participation of periodontal health as a goal for the region.

The application evaluates 12 parameters (“6 gold and 6 silver Questions”) that patients can assess their periodontal signs and symptoms. Based on an algorithm, recommendations are given to encourage the search for a professional diagnosis and an appropriate patient/professional interaction. The recommendations provided by this application are based on the survey finding about the possible characteristic parameters/situations/habits of users⁹ (Figure 2).

Evidence on the preventive impact of controlling risk factors related to periodontal diseases

The WHO (World Health Organization) has recommended the development of joint preventive strategies for many NCDs due to shared common risk factors (CRFA). In the region, however, there is limited

evidence as regards this type of approach and the use of personalized medicine.¹⁰ In PD, socio-environmental risk factors such as smoking, alcohol consumption, unbalanced diet, poor hygiene, inadequate access to dental services, stress, and occlusal trauma should be prioritized in health care.¹¹ Successful outcomes in preventing and reducing tobacco consumption in LATAM and the Caribbean must be analyzed and replicated for the prevention of other conditions and diseases. In the region, educational strategies for pregnant women have been implemented, demonstrating an increase in knowledge, practices, and empowerment for the control of PD and other risk factors.¹²

The authors summarized a consensus recommendations/call to action on the impact of preventive measures on social determinants, risk factors and behavioral changes in relation to PD throughout the life-course of individuals (Table 1).

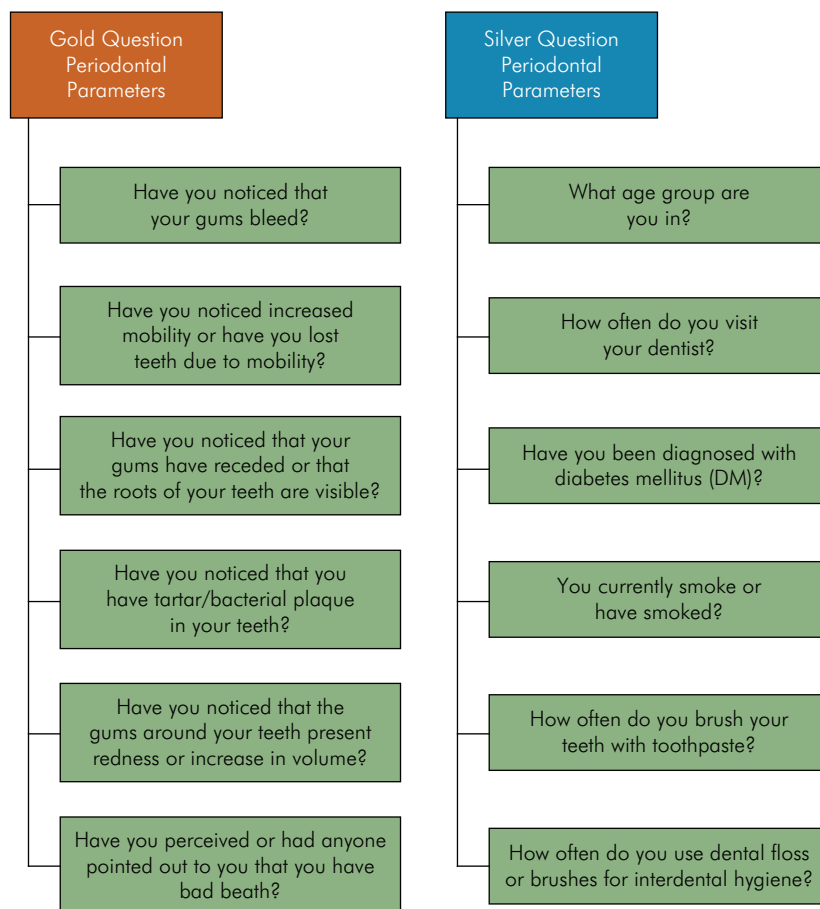


Figure 2. Gold and silver questions from the perio-awareness APP to facilitate patient/dentist empowerment.

Table 1. Recommendations on social determinants, risk factors and behavioral changes as regards PD over the life -course of individuals.

Questions?	Recommendations on social determinants, risk factors and behavioral changes relative to PD over the life-course of individuals	Call to action level
What strategy is required to empower the medical profession about the importance of PD prevention?	Community level: It is necessary to increase efforts to raise awareness about PD so that health authorities pay more attention to the importance of periodontal health.	CLR
	Develop and Implement (CPG) to advocate for periodontal health across all life stages, emphasizing risk management and adherence to lifestyle	
Who should lead implementation of these preventive strategies at the community and individual levels?	Community level: The participation of leaders in the region, who participate in public health policy decisions is required to link periodontal health into risk factor control programs and adherence to healthy lifestyles.	CLR
	Individual level: The dental office must become an additional setting where patients can learn about healthy lifestyles.	ILR
	Establish a collaboration network among dental and medical professionals to share knowledge, research findings, and educational resources on periodontal and systemic health interrelations.	
	Emphasize Personalized Oral Hygiene Education: Stress the importance of tailored oral hygiene instructions in professional development sessions for dental practitioners, catering to the diverse needs of patients including those with special needs.	
What is the research priority for the region on this topic?	Community level: Invest in studies exploring the impact of mobile health applications, tele-dentistry, and social media on oral health awareness and self-care. Focus on assessing how these technologies improve access to dental care for marginalized communities.(Perio-awareness APP Assessment)	RR
	Execute comprehensive campaigns across community settings such as schools, workplaces, and public spaces, using both traditional and digital media to highlight the risks of PD and its impacts on systemic health. Engage local influencers to help with extending the reach and effectiveness of campaigns.	

CLR: community level recommendation; ILR: individual level recommendations; RR: recommendations for research.

Evidence and recommendations on the impact of mechanical and chemical control of bacterial plaque and bleeding for the prevention of gingivitis

Evidence on the effectiveness of mechanical and chemical preventive strategies (community level)

The primary preventive action at community level involves health education programs to raise awareness among individuals at different stages of life, about the necessity and importance of daily oral hygiene care. To achieve this, these programs need to be implemented in different settings, such as schools and both public and private healthcare services, to reach the widest audience possible. However, the challenge to preventive actions at population level

is often related to access to healthcare services. Implementing effective educational programs to promote oral hygiene practices and providing easy access to dental services pose significant challenges. The lack of resources, adequate infrastructure, and awareness within communities can limit the effectiveness of preventive interventions.

Evidence on the effectiveness of mechanical and chemical preventive strategies (individual level)

Daily habits play a crucial role in the effective control of supragingival biofilm. Although brushing is considered an essential method, there are still some questions related to the recommendation of specific characteristics of manual brushes, use of electric brushes, and the choice of interproximal devices. In a systematic review evaluating mechanical control in

individuals undergoing periodontal maintenance, 80% of studies comparing manual and electric toothbrushes found no significant differences between them. However, the authors emphasize the lack of robust evidence due to the limited number of studies.¹³ As regards bristle design, toothbrushes with tapered tips showed superior reductions in the plaque index and gingival bleeding compared with round-tipped brushes.¹⁴ Relative to electric brushes, oscillating-rotating powered toothbrushes exhibited a slight difference in plaque control and improvement in gingival health when compared with frequency sonic powered toothbrushes.¹⁴ Moreover, more importantly than a technique, it should be emphasized that strategies must be taught and communicated to patients according to individual characteristics or their stratification according to risk.

A multicenter study on oral health behavior in South American adults showed that 84.2% of subjects brushed their teeth twice a day or more, but only 17.7% reported interproximal cleaning daily.¹⁵ Interproximal cleaning devices, especially dental floss, are more effective when combined with manual brushing than manual brushing alone. There is limited and inconsistent evidence for tooth cleaning sticks and oral irrigators,¹⁶ although interdental cleaners with rubber bristles were preferred by study participants.¹⁷ When prescribing mechanical control items, patient skills and preference should be considered, especially in older adults dealing with xerostomia and have low manual ability.

In SR, complementary antiseptics in mouthwashes and toothpaste have been reported to provide statistically significant reductions in gingival, bleeding and plaque indices, and combination of the two has shown better results.¹⁸ Recent studies have suggested reevaluation of oral health prevention and promotion. Recent research has focused on the effectiveness of fluoride toothpaste and other antimicrobial agents such as stannous fluoride-based toothpaste and sodium bicarbonate toothpaste. A SR found that stabilized SnF₂ toothpaste had a positive effect on reducing the accumulation of dental calculus, dental plaque, gingivitis, stains and halitosis.¹⁹⁻²¹ This intervention should be explored as a preventive aid in the progression of plaque-induced gingivitis to periodontitis.

Essential oils and cetylpyridinium chloride (CPC) mouthwash were the active ingredients most frequently used in preventing gingivitis. Overall, studies have shown improvements in the clinical parameters evaluated.¹⁸ When compared with a placebo solution, CPC demonstrated good efficacy for plaque and gingival inflammatory parameters on interproximal surfaces.²² Recently, a multi-component oral care regimen with a zinc formulation (Dual) and CPC + In mouthwash was shown to be effective in reducing gingival inflammation and supragingival biofilm in patients with gingivitis.²³

Evidence on the effectiveness of preventive strategies according to the life-course of the population (community/individual level and recommendation for research)

In the region, there is an unclear personalized or stratified prevention strategy throughout individuals' lives, with limited participation from other health professionals. In children and adolescents, prevention has been focused on dental caries, and periodontal health is not always considered. In the early life stages, children's limited autonomy emphasizes the active role of parents and caregivers in promoting healthy oral hygiene habits. Studies exploring mechanical methods for school-age children have demonstrated positive outcomes with manual, differently shaped, or electric toothbrushes.^{24,25} Customizing toothbrush handles enhances hygiene standards for Down syndrome children.²⁶ Alternative motivational methods, including musical videos or verbal instructions, have also demonstrated improvements in plaque and gingival indices.^{27,28} The literature remains uncertain about chemical control for preventing gingivitis in this age group.

In adolescence, many individuals in the region undergo orthodontic treatment without supervision for periodontal health, which is a decisive moment for future periodontal health and bone support. A SR revealed that orthodontic manual brushes outperformed conventional manual brushes in plaque removal, with no significant difference in gingival bleeding.²⁹ Electric toothbrushes, compared with manual types, demonstrated a significant reduction in both plaque and gingival indexes.³⁰ SR

comparing different mouthwashes for patients with fixed orthodontic appliances revealed similar results, indicating that chlorhexidine was effective in reducing biofilm and signs of gingival inflammation.^{31,32}

In young adults, only programs for pregnant women have prioritized the diagnosis and prevention of periodontal diseases. One study reported that the consumption of *L. reuteri* lozenges may be a useful complement in the control of pregnancy gingivitis.³³ In some countries, they take PD in diabetes into account in their clinical practice guidelines for diabetic patients, but they are clear about both the diagnostic procedures (including self-diagnosis) and the clinical management of the disease. It has been suggested that probiotics may provide additional benefits to the periodontal and peri-implant parameters in patients with type 2 diabetes.³⁴ A SR suggested that probiotic supplementation improves clinical parameters, reduces pathobionts and proinflammatory markers in patients with PD. However, there is a lack of evidence on its role in primary prevention and its impact at the community level. Another SR

showed a slight improvement in the inflammatory clinical parameters of patients treated with the use of probiotics in an experimental gingivitis model.³⁵ As the population survival rate increases, more people will need preventive and even peri-implant periodontal care. The above-mentioned situation adds to a greater probability of NCDs in adults and older adults. In the elderly, prosthetics and medical conditions significantly impact prevention strategies. A study characterized the oral health of elderly individuals as precarious, with nearly half requiring assistance for hygiene care. Additionally, challenging access to dental care underscores the importance of preventive measures.³⁶ Investing in health education for family members, caregivers, and nursing staff, along with the presence of a dental surgeon in elderly care institutions or hospitals, and organization of systematic care are deemed crucial.³⁷⁻³⁹ The authors summarized a consensus recommendations/call to action on the impact of mechanical and chemical control of plaque and bleeding for the prevention of gingivitis (Table 2).

Table 2. Recommendations on the impact of mechanical and chemical control of bacterial plaque and bleeding for the prevention of gingivitis.

Questions	Evidence and recommendations on the impact of mechanical and chemical control of bacterial plaque and bleeding for the prevention of gingivitis	Call to action level
What is the role of university education and scientific associations?	It is essential to implement educational programs and modern communication strategies (APP, social networks) in schools and public/private health services to disseminate information about the importance of mechanical and chemical control of dental biofilm, prebiotics and probiotics at different stages of life and its impact on the quality of life of children during their growth and development. This approach will facilitate community campaigns with the aim of promoting healthy oral hygiene habits. Integrate oral health education into schools and community initiatives, offering practical demonstrations of effective oral hygiene practices. Organize health fairs providing free dental screenings and educational workshops to emphasize the significance of oral hygiene.	CLR
What is the role of private oral product companies in PD	Ensure access to a variety of toothbrushes, interproximal devices, toothpaste, and mouthwashes in all communities, particularly in the more vulnerable populations, by means of public health policies that involve the state joining with oral products companies. Furthermore, specialized products that demonstrate benefits should be available at low costs in patients with a history of more advanced stages advanced stages of gingivitis and periodontitis.	CLR
What is the priority in research on this topic for the region?	Transform dental office waiting areas into educational hubs with resources such as videos, brochures, and interactive tools promoting mechanical and other adjunctive preventive strategies, such as prebiotics, probiotics and antimicrobial properties of the mouthwashes and dentifrices. It is essential to conduct research that assesses the efficacy of different prevention methods, across various age groups. Moreover, these studies should incorporate more patient-measured outcomes, focusing on the individual's perception of the products. It is necessary to evaluate the effectiveness of different formulations and concentrations of antimicrobial agents in dentifrices and mouthwashes; doses and use of probiotics and prebiotics.	RR

CLR: community level recommendation; ILR: individual level recommendations; RR: recommendations for research.

Evidence on the impact of PD preventive strategies for the management of systemic diseases and conditions that are related to periodontal diseases

There is strong evidence showing that people with periodontitis have an increased risk of dysglycemia, insulin resistance and higher HbA1C levels in patients with periodontitis and diabetes mellitus.⁴⁰ In the Colombian and Brazilian populations, periodontitis was associated with metabolic syndrome (MetS) and glucose intolerance.^{41,42} In a multicenter cohort study in Brazil, an association of PD with subclinical atherosclerosis was established.⁴³ Likewise, a relationship between periodontitis, severe periodontitis and Acute Coronary Syndrome was shown in Colombian and Chilean individuals.

Pregnant women with periodontal disease have shown an increased risk of adverse pregnancy outcomes (APOs), including preterm birth (PTB), low birth weight newborns, preeclampsia, and gestational diabetes mellitus (GDM). In Colombia, a study reported an association between the severity of periodontitis and pre-eclampsia (OR: 3, 95%CI: 1.91–4.87; $p < 0.001$).⁴⁴ Another study suggested an association between periodontal pockets and APOs in low-income pregnant women, highlighting factors such as threatened abortion, absence of antenatal care, hypertension, chronic infections, and periodontal diagnosis as important conditions associated with APOs.⁴⁵ Similarly, in Chile, a study with 870 pregnant women reported an association between gingivitis and PTB, with significant reductions in PTB observed in pregnant women who received periodontal treatment. Likewise, a recent study screening 1,086 pregnant women in Chile showed a high prevalence of periodontitis (73.1%), with a low percentage of patients with healthy periodontium or gingivitis (26.9%).⁴⁶ Other studies also suggested that pregnant women with gestational diabetes mellitus exhibited a worse periodontal condition than those with healthy pregnancies, measured by periodontal probing depth, clinical attachment loss, and bleeding on probing. Furthermore, the inflamed periodontal surface area was larger in those with GDM pregnancies.⁴⁷ Moreover, obesity was related to periodontitis severity, with a relative risk ratio (RRR)

of 1.66 (95%CI: 1.05–2.64; $p = 0.03$) and 1.57 (95%CI: 1.09–2.27; $p = 0.015$) for stage III periodontitis compared with those with periodontal healthy/gingivitis and stage II periodontitis, respectively.⁴⁶ However, these findings are not consistent across all Latin American countries. For instance, a Brazilian study was unable to demonstrate the association between the severity of periodontal disease and APOs.⁴⁸ The differences between the studies could be explained due to ethnic and socioeconomic variations, the prevalence and severity of periodontitis, case definitions, population heterogeneity, different health systems and monitoring the oral health care of pregnant women.

Evidence on the effectiveness of preventive strategies based on the association of periodontal diseases with systemic conditions (community level)

In recent years, a positive aspect has been the implementation of public policies, including clinical practice guidelines and comprehensive care routes directed towards pregnant women in LA. There are many beliefs about the safety of dental procedures during pregnancy, a lack of knowledge of the impacts on adverse pregnancy outcomes and oral health, and the need for oral hygiene during pregnancy, factors that discourage access to health services.⁴⁹ However, in LA, the public health ministries of Argentina, Brazil, Colombia, Chile, Ecuador, Peru, and Uruguay, among others, have established primary care programs for pregnant women in their countries, however, there is still no evidence of the impact of these programs on the community. Despite the extraordinary efforts of governments to implement these priority primary care programs, access to health programs continues to be limited.

In some countries, chronic patients are a priority in primary prevention, but it was not possible to completely identify the role and detailed care guidelines for health personnel relative to the control of periodontal disease. Many people from different populations, who have chronic diseases, and have a high prevalence of periodontitis, do not, however, go for dental visits regularly. Medicare service showed a lack of preventive dental care in African Americans/Black and Latin Americans, with lower educational

attainment and household income, who suffer from diabetes, prediabetes, hypertension, and are smokers.⁵⁰

Several studies were conducted to establish the impact of regular oral hygiene on the prevention of chronic diseases. In a 10-year cohort study of the National Health Insurance System-Korea Health Screening Cohort, tooth brushing ≥ 3 times/day showed a protective effect against new-onset of diabetes and on reducing blood sugar levels. HbA1C. The use of antiseptic products for plaque control in patients with NCDs and other medical or hospital conditions is controversial. Oral care in hospitalized patients in critical and non-critical conditions is recommended in the CPG to maintain oral health. Some systematic reviews, including Cochrane reviews, have shown that chlorhexidine reduces the risk of ventilator-associated pneumonia (VAP).^{51,52} There is controversy about the role of chlorhexidine in the incidence of mortality, and the evidence is weak.^{51,53,54}

The authors summarized a consensus recommendations/call to action on the impact of preventive strategies for the management of SD and PD related conditions (Table 3).

Research gaps, conclusions, and future needs

Evidence on the prevention of PD, qualitative research and behavioral changes continues to be scarce, at both the individual and community levels. In preventing periodontal diseases, the human factor plays an important role, that is, the physical, psychological, and social characteristics that affect human interaction with other people, in this case, the healthy or periodontally compromised patients and health professionals. Another challenge in the region is that each individual or community has unique social determinants and/or environmental and biological aspects that must be identified to

Table 3. Recommendations on the impact of preventive strategies for the management of systemic diseases and periodontal disease-related conditions.

Questions	Evidence and recommendations on the impact of preventive strategies for the management of systemic diseases and periodontal disease-related conditions.	Call to action level
Community level:		
What is the importance of communication strategies for the multidisciplinary management of systemic diseases and PD?	Educational programs directed towards the community on the benefits of attending oral health services during pregnancy. In addition, those women who wish to become pregnant need to be identified so that they can anticipate a pregnancy without periodontal disease. Patients with other conditions such as cardiovascular and metabolic disorders need to have more emphasis is on the prevention of PD.	CLR
Individual level		
What communication strategies should be implemented by periodontists in the region?	It is necessary to form a regional group of experts to contact regional and local scientific societies in medicine such as the regional network of the International Diabetes Federation, other medical associations, and health faculties. Build Partnerships with Patient Associations: Work with patient organizations to spread information about periodontal disease prevention and its connection with systemic health, customizing educational materials for diverse community needs. Train Dental Professionals in Patient Communication: Equip dental professionals with the skills to effectively communicate the connection between oral health and overall wellness and tools promoting healthy lifestyle choices.	ILR
What is the priority in research on this topic for the region?	Create care models that integrate oral health assessments into routine check-ups for individuals with chronic diseases or during pregnancy. Offer training on the systemic implications of periodontal health to non-dental healthcare providers. It is necessary to promote multicenter research that assesses the role of PD prevention with different approaches (mechanical therapy, antiseptics, foods with prebiotics functions, and probiotics tablets) and its role in the onset or control of systemic conditions.	RR

CLR: community level recommendation; ILR: individual level recommendations; RR: recommendations for research.

enable the success of preventive strategies.⁵⁵ The term situational awareness requires an understanding of the environment, and ability to anticipate variations in the health/disease process, which is why it is necessary to educate more empowered professionals, who are trained in behavioral sciences.

This consensus is a call for action to network between scientific societies, Universities, LAOHA, FDI, WHO/PAHO and the International Association for Dental Research (IADR), public and private entities, in order to develop research projects, unify and disseminate strategies, preventive measures, and CPG in periodontics. and to evaluate their clinical impact on oral and systemic health in different populations.

In the future, with the increasing availability of large datasets that integrate cellular and microbial

genomic information, information on organ function, aspects of the oral cavity and saliva, and behavioral patterns in populations, it will be possible to stratify population groups for the purpose of estimating individual risks for their periodontal health and empowerment needs more accurately.

Acknowledgments

This manuscript was prepared for the consensus titled “Latin America and Caribbean Periodontics Consensus 2024” organized by the Latin American Oral Health Association (LAOHA). The consensus process actively engaged experts from across the region, and the broader community was invited to review and contribute to the content. The resulting Consensus Report was derived from this paper. We would like to acknowledge the Colgate Palmolive Company for their support.

References

1. Glick M, Williams DM. FDI Vision 2030: delivering optimal Oral Health for All. *Int Dent J*. 2021 Feb;71(1):3-4. <https://doi.org/10.1016/j.identj.2020.12.026>
2. Bartold PM, Ivanovski S. P4 Medicine as a model for precision periodontal care. *Clin Oral Investig*. 2022 Sep;26(9):5517-33. <https://doi.org/10.1007/s00784-022-04469-y>
3. Cota LO, Villar CC, Vettore MV, Campos JR, Amaral GC, Cortelli JR, et al. Periodontal diseases: is it possible to prevent them? A populational and individual approach. *Braz Oral Res*. 2021 Sep;35 Supp 2:e098. <https://doi.org/10.1590/1807-3107bor-2021.vol35.0098>
4. Duque AD, Malheiros Z, Stewart B, Romanelli HJ. Strategies for the prevention of periodontal disease and its impact on general health in Latin America. Section III: prevention. *Braz Oral Res*. 2020 Apr;34 suppl 1:e025. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0025>
5. Kirchhof G, Lindner JF, Achenbach S, Berger K, Blankenberg S, Fangerau H, et al. Stratified prevention: opportunities and limitations. Report on the 1st interdisciplinary cardiovascular workshop in Augsburg. *Clin Res Cardiol*. 2018 Mar;107(3):193-200. <https://doi.org/10.1007/s00392-017-1186-y>
6. Málaga-Figueroa L, Alarcón MA, Pannuti CM, Horna P, López-Pacheco A, Gómez M, et al. Ibero-Panamerican Federation of Periodontology Delphi study on the trends of periodontology and periodontics by the year 2030: a Latin American consensus. *J Periodontol Res*. 2024 Apr;59(2):237-48. <https://doi.org/10.1111/jre.13221>
7. Duque-Duque A, Sanchez Martinez C, Catano M, Usuga D, Marin R. Changes in knowledge regarding the relationship between periodontitis and systemic diseases. Non-analytical cross-sectional study. *Int J Interdiscip Dent*. April,2024;(17):27-32. <https://doi.org/10.4067/s2452-55882024000100027>
8. Lozano E, Medina M, Gamonal J. Manifiesto por la promoción de la salud periodontal de la Federación Iberoamericana de Periodoncia (FIPP) y la Asociación Latinoamericana de Salud Bucal (LAOHA). *Int J Interdiscip Dent*. 2022 Apr;15(1):9-11. <https://doi.org/10.4067/S2452-55882022000100009>
9. Duque A, Benítez Silva CG, Rossing CK. Development of an application and proposal of recommendations to increase awareness of periodontal diseases for patients: concepts, rationale and use. *J Int Acad Periodontol*. 2023;25(2):102-12. <https://doi.org/10.14436/1466-2094.25.2.102-112.oar>
10. Bouchard P, Carra MC, Boillot A, Mora F, Rangé H. Risk factors in periodontology: a conceptual framework. *J Clin Periodontol*. 2017 Feb;44(2):125-31. <https://doi.org/10.1111/jcpe.12650>
11. Sheiham A, Watt RG. The common risk factor approach: a rational basis for promoting oral health. *Community Dent Oral Epidemiol*. 2000 Dec;28(6):399-406. <https://doi.org/10.1034/j.1600-0528.2000.028006399.x>

12. Avila YT, González YP, Hijuelos MG P. Intervención educativa sobre enfermedad periodontal en embarazadas. *Correo Científico Méd.* 2021 Nov;25(4).
13. Slot DE, Valkenburg C, Van der Weijden GA. Mechanical plaque removal of periodontal maintenance patients: a systematic review and network meta-analysis. *J Clin Periodontol.* 2020 Jul;47(S22 Suppl 22):107-24. <https://doi.org/10.1111/jcpe.13275>
14. Sluijs E, Slot DE, Hennequin-Hoenderdos NL, Valkenburg C, van der Weijden FG. The efficacy of an oscillating-rotating power toothbrush compared to a high-frequency sonic power toothbrush on parameters of dental plaque and gingival inflammation: a systematic review and meta-analysis. *Int J Dent Hyg.* 2023 Feb;21(1):77-94. <https://doi.org/10.1111/idh.12597>
15. Gómez MV, Toledo A, Carvajal P, Gomes SC, Costa RS, Solanes F, et al. A multicenter study of oral health behavior among adult subjects from three South American cities. *Braz Oral Res.* 2018;32(0):e22 <https://doi.org/10.1590/1807-3107bor-2018.vol32.0022>
16. Worthington HV, MacDonald L, Poklepovic Pericic T, Sambunjak D, Johnson TM, Imai P, et al. Home use of interdental cleaning devices, in addition to toothbrushing, for preventing and controlling periodontal diseases and dental caries. *Cochrane Database Syst Rev.* 2019 Apr;4(4):CD012018. <https://doi.org/10.1002/14651858.CD012018.pub2>
17. Weijden F, Slot DE, van der Sluijs E, Hennequin-Hoenderdos NL. The efficacy of a rubber bristles interdental cleaner on parameters of oral soft tissue health-a systematic review. *Int J Dent Hyg.* 2022 Feb;20(1):26-39. <https://doi.org/10.1111/idh.12492>
18. Figuero E, Roldán S, Serrano J, Escribano M, Martín C, Preshaw PM. Efficacy of adjunctive therapies in patients with gingival inflammation: a systematic review and meta-analysis. *J Clin Periodontol.* 2020 Jul;47(S22 Suppl 22):125-43. <https://doi.org/10.1111/jcpe.13244>
19. Johannsen A, Emilson CG, Johannsen G, Konradsson K, Lingström P, Ramberg P. Effects of stabilized stannous fluoride dentifrice on dental calculus, dental plaque, gingivitis, halitosis and stain: a systematic review. *Heliyon.* 2019 Dec;5(12):e02850. <https://doi.org/10.1016/j.heliyon.2019.e02850>
20. He T, Mazor S, Zou Y, Grender J, Farrell S, Sagel P, et al. Randomized clinical trial assessing anti-gingivitis efficacy of two stannous fluoride dentifrices and zinc/arginine dentifrice. *Am J Dent.* 2021 Apr;34(2):110-5.
21. Taschieri S, Tumbedi M, Francetti L, Corbella S, Del Fabbro M. Efficacy of 67% sodium bicarbonate toothpaste for plaque and gingivitis control: a systematic review and meta-analysis. *J Evid Based Dent Pract.* 2022 Jun;22(2):101709. <https://doi.org/10.1016/j.jebdp.2022.101709>
22. Langa GP, Muniz FW, Costa RD, Silveira TM, Rösing CK. The effect of cetylpyridinium chloride mouthrinse as adjunct to toothbrushing compared to placebo on interproximal plaque and gingival inflammation-a systematic review with meta-analyses. *Clin Oral Investig.* 2021 Feb;25(2):745-57. <https://doi.org/10.1007/s00784-020-03661-2>
23. Amaral GCLS, Hassan MA, Saraiva L, Nakao LY, Holzhausen M, Malheiros ZM, et al. The effect of a multicomponent oral care regimen on gingival inflammation: A randomized controlled clinical trial. *J Periodontol.* 2024 Apr;95(4):350-9. <https://doi.org/10.1002/JPER.23-0361>
24. Brockman RP, Laarveld B. Effect of insulin on gluconeogenesis and the metabolism of lactate in sheep. *Can J Physiol Pharmacol.* 1986 Aug;64(8):1055-9. <https://doi.org/10.1139/y86-181>
25. Zhao SM, Chen H, Yu PB, Wang J. [A clinical investigation of plaque control efficacy and safety of Sonicare toothbrush in children]. *Shanghai Kou Qiang Yi Xue.* 2018 Jun;27(3):313-7. Chinese.
26. Droubi L, Lafloof M, Alkurdi S, Sauro S, Mancino D, Haikel Y, et al. Does customized handle toothbrush influence dental plaque removal in children with Down Syndrome? A randomized controlled trial. *Healthcare (Basel).* 2021 Aug;9(9):1130. <https://doi.org/10.3390/healthcare9091130>
27. Jeong JS, Kim KS, Lee JW, Kim KD, Park W. Efficacy of tooth brushing via a three-dimensional motion tracking system for dental plaque control in school children: a randomized controlled clinical trial. *BMC Oral Health.* 2022 Dec;22(1):626. <https://doi.org/10.1186/s12903-022-02665-6>
28. Yıldırım S, Kayaaltı-Yüksek S. The effects of motivational methods applied during toothbrushing on children's oral hygiene and periodontal health. *Pediatr Dent.* 2020 Nov;42(6):424-30.
29. Marçal FF, Paulo JPM, Barreto LG, Guerra LMC, Silva PG. Effectiveness of orthodontic toothbrush versus conventional toothbrush on plaque and gingival index reduction: a systematic review and meta-analysis. *Int J Dent Hyg.* 2022 Feb;20(1):87-99. <https://doi.org/10.1111/idh.12511>
30. Sivaramakrishnan G, Alsobaiei M, Sridharan K. Powered toothbrushes for plaque control in fixed orthodontic patients: a network meta-analysis. *Aust Dent J.* 2021 Mar;66(1):20-31. <https://doi.org/10.1111/adj.12798>
31. Karamani I, Kalimeri E, Seremidi K, Gkourtsogianni S, Kloukos D. Chlorhexidine mouthwash for gingivitis control in orthodontic patients: a systematic review and meta-analysis. *Oral Health Prev Dent.* 2022 Jun;20(1):279-94. <https://doi.org/10.3290/j.ohpd.b3170043>
32. Ren X, Zhang Y, Xiang Y, Hu T, Cheng R, Cai H. The efficacy of mouthwashes on oral microorganisms and gingivitis in patients undergoing orthodontic treatment: a systematic review and meta-analysis. *BMC Oral Health.* 2023 Apr;23(1):204. <https://doi.org/10.1186/s12903-023-02920-4>

33. Schlagenhauf U, Jakob L, Eigenthaler M, Segerer S, Jockel-Schneider Y, Rehn M. Regular consumption of *Lactobacillus reuteri*-containing lozenges reduces pregnancy gingivitis: an RCT. *J Clin Periodontol*. 2016 Nov;43(11):948-54. <https://doi.org/10.1111/jcpe.12606>
34. Avelino LB, Rodrigues KT, Cruz NTS, Martins AA, Martins ARA. Effectiveness of probiotic therapy in the management of periodontal disease in diabetic patients: a scoping review. *Curr Diabetes Rev*. 2024;20(9):e281123223961. <https://doi.org/10.2174/0115733998271193231108054254>
35. Barboza EP, Arriaga PC, Luz DP, Montez C, Vianna KC. Systematic review of the effect of probiotics on experimental gingivitis in humans. *Braz Oral Res*. 2020 Mar;34:e031. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0031>
36. Oliveira TF, Embaló B, Pereira MC, Borges SC, Mello AL; Oliveira TFS de Embaló B, Pereira MC, Borges SC, Mello ALSF. Oral health of homebound older adults followed by primary care: a cross sectional study. *Rev Bras Geriatr Gerontol*. 2021 Oct;24(5):e220038. <https://doi.org/10.1590/1981-22562021024.220038.pt>
37. Ferreira RC, Schwambach CW, Magalhães CS, Moreira AN. [Dental care and oral hygiene practices in long-term geriatric care institutions]. *Cien Saude Colet*. 2011 Apr;16(4):2323-33. Portuguese. <https://doi.org/10.1590/S1413-81232011000400032>
38. Oliveira TF, Embaló B, Pereira MC, Borges SC, Mello AL. Oral health of homebound older adults followed by primary care: a cross sectional study. *Rev Bras Geriatr Gerontol*. 2021 Oct;24(5):e220038. <https://doi.org/10.1590/1981-22562021024.220038.en>
39. Silva HP, Koppe B, Brew MC, Sória GS, Bavaresco CS. Approach to the most prevalent oral disorders among the elderly: an integrative review focusing on primary health care. *Rev Bras Geriatr Gerontol*. 2017 Jun;20(3):430-40. <https://doi.org/10.1590/1981-22562017020.160199>
40. Botero JE, Yepes FL, Roldán N, Castrillón CA, Hincapié JP, Ochoa SP, et al. Tooth and periodontal clinical attachment loss are associated with hyperglycemia in patients with diabetes. *J Periodontol*. 2012 Oct;83(10):1245-50. <https://doi.org/10.1902/jop.2012.110681>
41. Jaramillo A, Contreras A, Lafaurie GI, Duque A, Ardila CM, Duarte S, et al. Association of metabolic syndrome and chronic periodontitis in Colombians. *Clin Oral Investig*. 2017 Jun;21(5):1537-44. <https://doi.org/10.1007/s00784-016-1942-9>
42. Musskopf ML, Daut LD, Weidlich P, Gerchman F, Gross JL, Oppermann RV. Metabolic syndrome as a risk indicator for periodontal disease and tooth loss. *Clin Oral Investig*. 2017 Mar;21(2):675-83. <https://doi.org/10.1007/s00784-016-1935-8>
43. Batista R, Rosetti EP, Zandonade E, Roelke LH, Vettore MV, Oliveira AE. Association between periodontal disease and subclinical atherosclerosis: the ELSA-Brasil study. *Cad Saude Publica*. 2012 May;28(5):965-76. <https://doi.org/10.1590/S0102-311X2012000500015>
44. Contreras A, Herrera JA, Soto JE, Arce RM, Jaramillo A, Botero JE. Periodontitis is associated with preeclampsia in pregnant women. *J Periodontol*. 2006 Feb;77(2):182-8. <https://doi.org/10.1902/jop.2006.050020>
45. Lafaurie GI, Gómez LA, Montenegro DA, De Avila J, Tamayo MC, Lancheros MC, et al. Periodontal condition is associated with adverse perinatal outcomes and premature rupture of membranes in low-income pregnant women in Bogota, Colombia: a case-control study. *J Matern Fetal Neonatal Med*. 2020 Jan;33(1):16-23. <https://doi.org/10.1080/14767058.2018.1484092>
46. Ramírez V, Weber L, Hernández M, Realini O, Bendek MJ, Busso D, et al. Obesity is related to maternal periodontitis severity in pregnancy: a cross-sectional study. *Clin Oral Investig*. 2023 Sep;27(9):5509-18. <https://doi.org/10.1007/s00784-023-05170-4>
47. Chaparro A, Zúñiga E, Varas-Godoy M, Albers D, Ramírez V, Hernández M, et al. Periodontitis and placental growth factor in oral fluids are early pregnancy predictors of gestational diabetes mellitus. *J Periodontol*. 2018 Sep;89(9):1052-60. <https://doi.org/10.1002/JPER.17-0497>
48. Krüger MS, Casarin RP, Pinto GD, Pappen FG, Camargo MB, Correa FO, et al. Maternal periodontal disease and adverse perinatal outcomes: is there an association? A hospital-based case-control study. *J Matern Fetal Neonatal Med*. 2019 Oct;32(20):3401-7. <https://doi.org/10.1080/14767058.2018.1464554>
49. Kamalabadi YM, Campbell MK, Zitoun NM, Jessani A. Unfavourable beliefs about oral health and safety of dental care during pregnancy: a systematic review. *BMC Oral Health*. 2023 Oct;23(1):762. <https://doi.org/10.1186/s12903-023-03439-4>
50. Gordon NP, Mosen DM, Banegas MP. Oral health care: a missing pillar of total health care? *Perm J*. 2021 Dec 3;25:21.080. <https://doi.org/10.7812/TPP/21.080>
51. Cruz JC, Martins CK, Piassi JE, Garcia Júnior IR, Santiago Junior JF, Faverani LP. Does chlorhexidine reduce the incidence of ventilator-associated pneumonia in ICU patients? A systematic review and meta-analysis. *Med Intensiva (Engl Ed)*. 2023 Aug;47(8):437-44. <https://doi.org/10.1016/j.medine.2022.11.002>
52. Zhao T, Wu X, Zhang Q, Li C, Worthington HV, Hua F. Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. *Cochrane Database Syst Rev*. 2020 Dec;12(12):CD008367. <https://doi.org/10.1002/14651858.CD008367.pub3>
53. M D, W W, K E, D V, S B. Effects of chlorhexidine gluconate oral care on hospital mortality: a hospital-wide, observational cohort study. *Intensive Care Med*. 2018 Jul;44(7):1017-26. <https://doi.org/10.1007/s00134-018-5171-3>

54. Gualtero DF, Lafaurie GI, Buitrago DM, Castillo Y, Vargas-Sanchez PK, Castillo DM. Oral microbiome mediated inflammation, a potential inductor of vascular diseases: a comprehensive review. *Front Cardiovasc Med*. 2023 Aug;10:1250263. <https://doi.org/10.3389/fcvm.2023.1250263>
55. Romanelli H. El rol del factor humano en el éxito de la práctica clínica odontológica. *Rev Asoc Odontol Argent*. 2023 Sep-Dec;(111):1-4. <https://doi.org/10.52979/raoa.1111201.1241>

Treatment of periodontal diseases: Latin America and the Caribbean Consensus 2024

Ricardo Guimarães FISCHER^(a) 
Guilherme Castro Lima Silva do AMARAL^(b) 
Aldrin André HUAMÁN-MENDOZA^(b) 
Luis Rossy BUENO^(c) 
Cristina Cunha VILLAR^(b) 

^(a)Pontifícia Universidade Católica do Rio de Janeiro – PUCRJ, School of Dentistry, Department of Periodontics, Rio de Janeiro, RJ, Brazil.

^(b)Universidade de São Paulo – USP, School of Dentistry, Department of Periodontics, São Paulo, SP, Brazil.

^(c)Fundación Juan José Carraro, Buenos Aires, Argentina.

Declaration of Interests: The authors certify that they have no commercial or associative interest that represents a conflict of interest in connection with the manuscript.

Corresponding Author:

Cristina Cunha Villar
E-mail: villar@usp.br

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0121>

Submitted: July 29, 2024
Accepted for publication: August 1, 2024
Last revision: August 14, 2024

Abstract: The prevalence of periodontitis in Latin American and Caribbean countries (LACC) drew attention to a significant public health issue exacerbated by socio-economic disparities. This consensus report, based on the European Federation of Periodontology (EFP) S3 level clinical practice guidelines, proposed a multifaceted approach to periodontal health-care. The report highlighted the critical need for holistic, population-wide health policies and underscored the lack of documented community interventions in contemporary literature. The consensus advocated for a patient-centered approach to periodontal care, with non-surgical and surgical interventions, and a long-term commitment to supportive periodontal care (SPC). It emphasized the importance of patient engagement in biofilm control by means of home-care and professional interventions for long-term periodontal health. The report also stressed that subgingival instrumentation benefits even severely compromised teeth, by significantly reducing probing depths and gingival inflammation. Moreover, it emphasized the importance of personalized, long-term SPC for maintaining oral health post-treatment, and pointed out the need to identify factors influencing patient adherence. The aim of this report was to provide actionable guidance for clinicians and policymakers, focused on improving periodontal health outcomes and quality of life in LACC.

Keywords: Periodontal Diseases; Dental Care; Public Health; Latin America; Caribbean Region.

Introduction

The dynamic and diverse panorama of periodontal healthcare in Latin America and the Caribbean countries (LACC) reflects this region's multifaceted cultural and geographical mosaic. Within this context, periodontal disease emerges as a substantial health concern, necessitating a comprehensive approach that encompasses all aspects of periodontal treatment, from the initial stages of oral hygiene instructions (OHI) to the pivotal phase of supportive periodontal care (SPC). Building upon this framework, this report synthesizes contemporary scientific knowledge and the EFP S3 level clinical practice guideline¹ to support clinical decisions and shape cost-effective public policies. We explored the full spectrum of periodontal therapy, addressing the initial phase of risk factor



control, non-surgical subgingival instrumentation, subsequent reinterventions or surgical interventions when necessary, and SPC for patients with Stages I-III periodontitis. The treatment approach to periodontitis is stage-dependent, requiring a pre-established, gradual sequence of interventions, with more complex and costly procedures as the disease progresses. Our focus is to guide practitioners and policymakers toward evidence-based treatments, emphasizing the role of Primary Health Care and addressing the unique challenges within this region. The aim of this review is to provide insights into, and practical guidelines to enhance periodontal health and quality of life across LACC.

Periodontal treatment: first step

The first phase of periodontal therapy is crucial for motivating patients to change behaviors, especially in effectively removing supragingival biofilm and managing risk factors for periodontal disease, and this is applicable to all stages and grades of periodontitis.¹

Home-care treatment

Effective control of supragingival biofilm hinges on guiding patients towards improved oral hygiene and behavioral changes.¹ Brushing twice daily for at least two minutes is essential, although the best brushing technique and duration are still under debate.^{2,3} An 11-year study demonstrated that brushing twice daily significantly reduced the number of teeth with probing depths (PD) ≥ 4 mm.⁴ However, minimizing excessive brushing force is important to avoid gingival recession and non-carious cervical lesions (NCCLs).³ While powered toothbrushes may enhance patient compliance,⁵ two studies from Brazil found no significant differences among ultrasonic, electric, and manual brushes in clinical and microbiological outcomes.^{6,7} However, systematic reviews have indicated that powered toothbrushes are generally more effective in reducing gingivitis and biofilm,^{8,9} leading to an additional 11% reduction in gingivitis and an additional 21% reduction in supragingival biofilm. Interdental brushes are preferred for interproximal cleaning, as they significantly reduced gingival inflammation.^{10,1} According to a Brazilian study, patients who did

not perform interproximal cleaning are 2.19 times more likely to develop gingivitis.¹¹ Psychological interventions such as cognitive behavioral therapy and motivational interviewing have shown limited effectiveness in improving oral hygiene habits.^{12,1}

Professional treatment

Professional supragingival biofilm removal (PSBR) and management of factors retentive to biofilm are essential for primary and secondary prevention of periodontal diseases.¹ A split-mouth clinical trial in Brazil revealed that PSBR reduced the need for subgingival procedures by 48%.¹³ PSBR also helps maintain periodontal stability during SPC.¹⁴

Risk factor control

Effective risk management, especially targeting tobacco smoking and diabetes, is crucial for periodontal health.¹ Smoking cessation strategies such as the '5 A's' model and '5 R's' approach are effective.¹⁵ Economic analysis in Brazil has shown the cost-effectiveness of smoking cessation programs for periodontitis patients, emphasizing their role in preventing tooth loss and enhancing quality of life.¹⁶ A two-year longitudinal study in Brazil indicated that smoking cessation led to gains in clinical attachment level (CAL) and reduced PD.¹⁷ A systematic review of longitudinal studies revealed that the risk of tooth loss for former smokers was similar to that for non-smokers (Relative Risk [RR]=1.15, 95% CI=0.98-1.35), in contrast to current smokers who faced a significantly higher risk (RR=2.60, 95% CI=2.29-2.96).¹⁸ The length of smoking cessation is key in mitigating risks.^{18,19} Successful smoking cessation predictors in Brazilian periodontitis patients included being male, not living with smokers, and showing low nicotine dependence.²⁰

Diabetes management is also crucial for enhancing periodontal treatment outcomes and ensuring long-term stability in periodontitis patients.²¹ Educational interventions, dietary counseling, and referrals for blood glucose management are essential.^{1,21} While no direct evidence has linked physical activity and weight loss to periodontal outcomes, these lifestyle changes may indirectly benefit periodontal health by reducing inflammation, improving bone density, and increasing insulin.²²

Periodontal treatment: second step

The second stage of periodontal treatment emphasizes the removal of calculus and subgingival biofilm by means of meticulous subgingival instrumentation.^{1,23} This technique is effective even for severely compromised teeth and aims to reduce PD, gingival inflammation, and the number of diseased sites.²⁴⁻²⁷ Nevertheless, the success of this stage depends heavily on successful implementation of the first step of periodontal treatment.¹ Subgingival instrumentation results in a reduction of 2.2 mm in PD, and a 0.5–2 mm gain in CAL in deep sites.²⁴⁻²⁶ A recent meta-analysis reported an increase from 39.1% to 64.1% in sites with PD < 3mm after subgingival instrumentation, reflecting a significant rise in the number of healthier sites.²⁸ Furthermore, the meta-analysis revealed a significant reduction of 15.5% in sites with PD ≥ 5 mm (95%CI: 7.86–23.13, $p < 0.001$), with the mean percentage of sites with PD ≥ 5 mm decreasing from 28.23% to 11.71% before and after treatment. Notably, four studies included in this meta-analysis were conducted in Latin America: three from Brazil²⁹⁻³¹ and one from Chile.³² However, the treatment efficacy varies depending on factors such as tooth type, with non-molars showing better response than molars, extent of periodontal destruction, local factors, and patient age.³³ For instance, while 75% of all pockets resolved in patients with stage II periodontitis, the closure rates were approximately 66% and 50% in localized and generalized stage III–IV periodontitis, respectively.²⁸ Furthermore, this shows that if non-surgical subgingival instrumentation were the only therapy applied in severe periodontitis, it may be ineffective in achieving periodontal stability over time.

Contemporary guidelines do not specify the number of sessions for subgingival instrumentation but caution against potential systemic risks with full-mouth disinfection.¹ Both hand instruments and sonic/ultrasonic devices, used individually or in combination, are recommended for effective subgingival instrumentation.³⁴

Despite potential benefits, including in patients with diabetes³⁵ - the European Federation of Periodontology (EFP) advises against the combined use of lasers

and antimicrobial photodynamic therapy (aPDT) with subgingival instrumentation due to limited supporting evidence.³⁶ Similarly, the adjunctive use of sustained-release local antimicrobials and host-modulating agents such as statins, probiotics, sub-antimicrobial doxycycline, bisphosphonates, non-steroidal anti-inflammatory drugs (NSAIDs), omega-3 polyunsaturated fatty acids, metformin, doxycycline, tetracycline, and minocycline have demonstrated some clinical benefits. However, their use is not recommended due to limited evidence, potential biases in the studies, lack of standard protocols, and potential side effects.^{1,37-39}

As regards antiseptic mouthwashes, a systematic review pointed out that the use of chlorhexidine-based mouthwash adjuvant to subgingival instrumentation can significantly reduce PD at 40 and 60 days (Mean Difference [MD] = 0.33 mm, 95%CI: 0.08–0.58, $p = 0.01$) and at 180 days (MD = 0.24mm, 95%CI: 0.02–0.47, $p = 0.035$), without affecting CAL when compared with subgingival instrumentation alone.⁴⁰ It is noteworthy that four Brazilian randomized clinical trials were included in this systematic review and meta-analysis.^{29,41-43} Moreover, studies on the Brazilian population have reported that the adjunctive use of chlorhexidine mouthwash improves not only clinical but also microbiological parameters, by reducing the levels of red and orange complexes and increasing the presence of symbiotic species.⁴¹⁻⁴³ Nonetheless, its use should only be considered in patients with adequate plaque control, taking into account potential side effects and costs.¹

When considering antibiotics as adjunctive therapy, systemic antibiotics are particularly effective in young patients with generalized Stage III or IV periodontitis.¹ A recent systematic review concluded that systemic antibiotics, especially a combination of adjunct metronidazole (MTZ) and amoxicillin (AMX), significantly reduced the number of sites with PD exceeding 5 mm by 40% to 50% and significantly improved CAL.⁴⁴ Notably, 11 out of the 28 studies included in this review were conducted in Latin America: nine in Brazil, one in Chile, and one in Colombia.⁴⁴ Although there is a body of strong evidence supporting the additional effects of systemic antibiotics, their routine adjunctive use in periodontal

treatment is discouraged due to health risks and concerns about antibiotic resistance.^{44,45}

In summary, while subgingival instrumentation continues to be pivotal in periodontal therapy, the efficacy of adjunct methods requires thorough evaluation considering the associated risks, benefits, and quality of evidence. Further research is needed to establish clear guidelines and protocols for their use in LAAC.

Periodontal treatment: third step

After the second step of periodontal treatment, a periodontal re-evaluation is required to assess the individual's healing response. Since maintaining teeth with adequate health, function, and esthetics is challenging to report and requires long periods of evaluation, surrogate measures such as changes in PD, CAL and inflammation indices (*e.g.* reduction in bleeding of probing) are used.⁴⁶ The proposed endpoints for successful treatment include the absence of PD ≥ 4 mm with bleeding on probing (BOP) and no PD ≥ 6 mm. However, these endpoints are often not achieved. In such cases, a third step of therapy must be implemented. This may include repeated subgingival instrumentation with or without adjunctive therapies, access flap surgery (AFS) for improved access, and resective and regenerative surgeries to reduce periodontal defects, particularly furcation and vertical defects.¹

When comparing AFS with non-surgical subgingival instrumentation, the effectiveness depends on the initial PD. AFS has been demonstrated to show significantly greater reduction in PS in initially deep pockets (PD ≥ 6 mm) in both short-term (< 1 year, MD = 0.67 mm, 95%CI: 0.37–0.97) and long-term studies (≥ 1 year, MD = 0.39 mm, 95%CI: 0.09–0.70), without significant differences in CAL gain and patient preference.⁴⁷ However, in shallow pockets, AFS has resulted in significantly greater CAL loss in both short-term (MD = 0.43 mm, 95%CI: 0.56,–0.29) and long-term evaluations (MD = –0.27 mm, 95%CI:–0.34,–0.20).⁴⁷ Notably, this systematic review included a Brazilian randomized clinical trial that showed both minimally invasive surgical and non-surgical approaches led to significant reductions in PD and gains in CAL, with no significant differences

between the two groups.⁴⁸ Similar studies have demonstrated that the percentage of residual sites with PD > 3 mm after treatment varied from 17% to 49% after AFS, and 20% to 62% after subgingival instrumentation.^{49–53}

A systematic review and meta-analysis demonstrated that pocket reduction/elimination techniques were superior to AFS 6–12 months post-surgery (MD = 0.47 mm, 95%CI: 0.7–0.24), especially in sites with an initial PD ≥ 6 mm. However, longer-term follow-up (36–60 months) did not reveal significant differences between the two surgical approaches.⁵⁴

As regards regenerative surgeries for the treatment of vertical defects, all regenerative therapies resulted in better clinical outcomes when compared with AFS. Both guided tissue regeneration (GTR) and enamel matrix derivative (EMD) significantly enhanced CAL gain in intrabony defects compared with AFS alone (MD = 1.43 mm, 95%CI: 0.76–2.22; and MD = 1.27 mm; 95%CI=0.79–1.74, respectively).⁵⁵ In a recent Brazilian randomized clinical trial involving patients with controlled type 2 diabetes mellitus, the treatment of vertical defects using a simplified papilla preservation flap with and without EMD were compared. The defects treated with papilla preservation flap and EMD exhibited significantly greater CAL gain (3.31 ± 0.96 mm vs 1.61 ± 1.12 mm, $p = 0.001$) and PD reduction (5.15 ± 1.21 mm vs 2.84 ± 0.98 mm, $p = 0.001$) compared with the defects treated with the papilla preservation flap alone, at 6 months follow-up.⁵⁶ Furthermore, periodontal regeneration using EMD or bone grafts with or without resorbable membranes is also indicated for mandibular or maxillary buccal class II furcations.¹

Costs

An important consideration in periodontal therapy is the extra cost of surgery, which adds 746 Euros per patient to the costs over 6 months in comparison with subgingival instrumentation alone. However, at 12 months, 46 Euros of this cost could be offset due to a reduced need for SPC and systemic antibiotics.⁵⁷ A study by The Economist found that professionally managed periodontitis is cost-effective in European countries. Unfortunately, comparable data for LACC is lacking. Differences in

healthcare systems, economic conditions, and patient demographics mean that findings from other regions may not apply directly to LACC. Therefore, further research specifically related to LACC countries is necessary to understand the economic and clinical implications of periodontal therapy options in these diverse healthcare environments.

In LACC, a key challenge is the cost barrier to accessing dental services, particularly for low-income families. Dental care is often primarily available through public services, universities, and military dental services, but these may be limited in scope and reach. In Brazil, specialized public-health clinics known as Dental Specialties Centers (DSC) provide periodontal surgeries after a referral from the Family Health Strategy (FHS).⁵⁸ A major difficulty with this system is inadequate periodontal diagnosis at the FHS level since this leads to overbooking at DSCs.⁵⁹ Furthermore, the appointment control center lacks protocols for prioritizing care, and there is a scarcity of DSCs throughout the country. Public coverage of dental care for periodontitis needs to be reviewed by policymakers and commissioners across LACC to ensure equitable access to necessary treatments and improve overall public health outcomes in the region.

Supportive periodontal care

Both LACC dentists and patients need to understand the significance of SPC, as it is a key procedure in preventing the recurrence of periodontal disease and in promoting long-term oral health after periodontal therapy. This involves updating medical and dental histories, managing risk factors such as smoking and diabetes, and promoting behavioral changes that include good oral hygiene and adherence to maintenance schedules.¹ During clinical examinations, periodontal and peri-implant conditions are assessed, and this allows for tailored OHI. SPC also includes removing factors that promote plaque-retention and supragingival biofilm, polishing, and subgingival instrumentation of moderate and deep sites. A Brazilian study pointed out that oral prophylaxis, combined with OHI and subgingival instrumentation were more effective in reducing probing depths ≥ 5 mm than OHI and prophylaxis alone during SPC.⁶⁰

Home-care therapy during SPC

In specific cases, antiseptic mouthwashes and dentifrices are recommended to control gingivitis during SPC. Mouthrinse options include those with essential oils, chlorhexidine, and cetylpyridinium chloride. For dentifrices, formulations with triclosan-copolymer, chlorhexidine, and stannous fluoride-sodium hexametaphosphate are considered effective.¹ A Brazilian randomized controlled trial with a 2-year follow-up demonstrated that dentifrice containing 0.3% triclosan + 2.0% PVM/MA copolymer was more effective than regular fluoride dentifrice in reducing BOP, plaque index, and the percentage of sites with PD greater than 4 mm during the SPC.⁶¹

Determining SPC Frequency

The ideal frequency for SPC is subject to debate, with recommended intervals ranging from two weeks to 18 months. Longitudinal studies with the aim of tailoring SPC frequency to individual risk profiles have yielded mixed results. For example, Matuliene et al.⁶² categorized 160 patients into risk categories, suggesting annual sessions for low-risk patients and up to four sessions yearly for high-risk patients. Despite increased SPC frequency, higher risk was associated with more tooth loss. Similarly, Trombelli et al.⁶³ observed varying tooth loss rates across risk groups despite their comparable SPC schedules. A Brazilian study⁶⁴ found monthly visits improved plaque scores but did not significantly alter other periodontal measures when compared with three-month intervals. Recent research by Ravidà et al.⁶⁵ suggested SPC visit frequencies based on periodontitis severity: every 7.4 months for stages I-II, 6.7 months for III-IV, 7.2 months for grade B, and 6.7 months for grade C, with shorter intervals recommended for smokers, diabetics, and the elderly.

Adherence to SPC

Adherence to SPC is vital to prevent tooth loss and recurrent periodontitis. Non-adherence leads to a 26% higher risk of tooth loss⁶⁶ and an increased risk of periodontitis progression.⁶⁷ Regular SPC adherence in Brazil significantly reduced annual tooth loss from 0.36 to 0.12 teeth/year.⁶⁸ Adherence rates vary widely, ranging from 11% to 88%. A Brazilian study indicated

only 26% of patients consistently returned for SPC, with 40% doing so irregularly.⁶⁹ Discontinuation of SPC is more common in the first few years.⁷⁰ Factors influencing discontinuation include age, female gender, personality traits such as anxiety, dental fear, systemic health conditions, smoking, socio-economic status, and lack of information.^{70,71} A Brazilian study noted women under 30 or over 51, particularly those undergoing non-surgical therapy, were more likely to be non-compliant.⁷² However, factors such as smoking cessation, older age, low percentage of BOP, severe periodontal disease, longer active treatment duration, and extended SPC intervals improve adherence.⁷¹ Regional differences, across Brazil, Venezuela, Chile, and Argentina, emphasized the impact of cultural and socio-economic conditions, and oral hygiene knowledge on SPC adherence,⁷³ highlighting the need for tailored approaches to SPC adherence strategies.

Long-term periodontal outcomes during SPC

The average annual tooth loss among SPC patients ranges from 0.1 to 0.2 teeth, with significant patient-specific variations.⁷⁴ A small group of SPC patients was responsible for the majority of tooth loss, which was influenced by factors such as age, gender, smoking, diabetes, advanced periodontitis, and adherence to SPC, as well as specific tooth characteristics such as maxillary and molar teeth, initial PD, number of sites with PD ≥ 5 mm and involvement of furcation.^{65,74,75} In Brazil, predictors of molar loss during SPC include gingival bleeding, advanced furcation lesions, and patient characteristics such as age over 50, male gender, diabetes, smoking, and non-compliance.⁷⁶ In a 30-year longitudinal study of SPC after periodontal therapy, only 201 teeth (5.1%) were lost, with 39 occurring for periodontal reasons. Periodontitis stages III or IV were associated with greater tooth loss during SPC compared with stages I or II (OR = 2.10; $p = 0.048$). Patients with generalized periodontitis also showed a statistically significant increase in tooth loss compared with those with localized periodontitis (OR = 3.24; $p = 0.016$).⁷⁷ Of interest, strict adherence to SPC can mitigate the negative effects of not achieving stable periodontal health after treatment.⁷⁸

A correlation has also been observed between the duration of SPC follow-up and clinical attachment loss. Patients with follow-ups longer than 10 years exhibited a slightly higher incidence of attachment loss (26.3%) compared to those with 5 to 10 years of SPC (22.1%).⁷⁹ This emphasizes the progressive nature of periodontal disease over time and the importance of long-term maintenance. Brazilian studies have linked tooth loss and recurrence of periodontitis during SPC to the male gender, periodontitis severity, surgical therapy, and lifestyle factors such as irregular SPC adherence, poorly controlled diabetes, smoking, intense alcohol use, poor oral hygiene, and depressive disorders.^{68,80-84}

Compliance with SPC is crucial in preventing tooth loss, however, it may not be cost-effective for all patients. Compliant patients in more advanced stages of periodontitis (Stage III/IV and Grade B/C) incur lower cumulative costs for relapse treatments.⁸⁵ Conversely, patients diagnosed with stage I/II, grade A periodontitis might benefit financially from fewer SPC visits, with a minimum of one visit per year.⁸⁵ Moreover, there has been a disparity in periodontitis progression and tooth loss between private and public academic patients in Brazil, with lower rates in private settings.⁸⁶ These findings emphasize the complexity of periodontal disease progression and the necessity for tailored, comprehensive SPC strategies that consider both periodontal status, systemic health, and socio-economic factors.

Social perspectives and challenges of treating periodontitis in LACC

In LACC, the management of periodontitis is inextricably linked to the region's complex socio-economic landscape. Despite modest regional Gross Domestic Product (GDP) growth, averaging around 2% (World Bank, 2023), the region grapples with extreme poverty and income inequalities, which profoundly affect public health initiatives, including the management of periodontal diseases. Stark income inequality, where the wealthiest 10% of the population earns 55% of total income, while the poorest 50% earns just 10% (CAF, Banco de Desarrollo de América Latina), intensifies these disparities in access to healthcare. Consequently,

periodontal disease do not only represent a public health challenge but also serve as indicators of deeper socio-economic inequalities, with a notably higher prevalence in lower socioeconomic groups. Healthcare spending in LACC, at approximately 6.9% of GDP in 2019, is below the OECD (Organization for Economic Co-operation and Development) countries average of 8.5%, and the allocation for dental care is even more constrained. This limited budget fails to address the needs of the regional population, particularly those in lower-income brackets, where the burden of periodontal diseases is most significant. Thus, addressing periodontitis in these regions calls for interventions that are both cost-effective and accessible, focusing on preventive strategies and early diagnosis and interventions.

Addressing periodontitis in LACC also requires a paradigm shift in dental academic institutions, clinical practices, and national dental associations toward adopting evidence-based, feasible, and cost-effective strategies. This shift involves focusing not only on isolated treatment options, but also

on structured preventive programs that promote healthy lifestyles. These programs are likely to be the most cost-effective method for optimal periodontal care. Such a transformative approach necessitates ongoing education and regular updates in clinical training to accurately reflect the unique realities of the region. Moreover, the diversity of oral healthcare systems across LACC, influenced by varied economic and political factors, poses challenges to the uniform implementation of these strategies. While many LACC have established national oral health policies focusing on the prevention, diagnosis, treatment, and maintenance of periodontal diseases (as detailed in Table), the effectiveness of these policies in real-world practice remains largely unexplored. The management of periodontitis should follow clinical protocols that are not only tailored to local social and oral health conditions but also to resource availability. These strategies must be both clinically effective and economically feasible, with the goal of ensuring equitable access to oral health services.

Table. Oral health policies with periodontal treatment strategies implemented in LACC countries.

Country	Access link
Argentina	https://www.sssalud.gob.ar/pmo/res_s_02_201.pdf
Bolivia	https://www.minsalud.gob.bo/images/Descarga/saludOral/2010-Normas_Salud_Oral-6316.pdf
Brazil	https://aps.saude.gov.br/noticia/22036
Chile	https://www.minsal.cl/wp-content/uploads/2022/02/PLAN-NACIONAL-DE-SALUD-BUCAL-2021-2030.pdf
Costa Rica	https://www.ministeriodesalud.go.cr/index.php/biblioteca-de-archivos-left/documentos-ministerio-de-salud/ministerio-de-salud/planes-y-politicas-institucionales/politicas-en-salud-1/5753-politica-nacional-de-salud-bucal-2022-2032/
Ecuador	https://www.salud.gob.ec/wp-content/uploads/2016/09/Protocolos-Odontol%C3%B3gicos.pdf
El Salvador	https://www.transparencia.gob.sv
Honduras	https://secretariadesaludhn.wordpress.com/programas-de-la-secretaria-de-salud/
Mexico	https://minsa.gob.pa/programa/programa-de-salud-bucal
Panamá	https://minsa.gob.pa/programa/programa-de-salud-bucal
Paraguay	https://www.gub.uy/ministerio-salud-publica/comunicacion/publicaciones/programa-nacional-de-salud-bucal
Peru	https://cdn.www.gob.pe/uploads/document/file/306236/Resoluci%C3%B3n_Ministerial_N__324-2019-MINSA.PDF
Dominican Republic	https://sns.gob.do/cartera-servicios-niveles-atencion/
Uruguay	https://www.gub.uy/ministerio-salud-publica/comunicacion/publicaciones/programa-nacional-de-salud-bucal
Venezuela	https://www.sld.cu/galerias/pdf/uvs/saludbucal/presenvenez.pdf

Conclusions, research gaps, and future needs

Conclusions

- a. **Holistic approach:** The consensus emphasized a comprehensive approach to periodontal healthcare, integrating individual risk factor management with a combination of non-surgical and surgical treatments, and a long-term commitment to SPC (Figure).
- b. **Patient involvement:** This stresses the necessity of patient engagement in biofilm control by means of home-care and professional interventions for long-term periodontal health.
- c. **Tailored SPC programs:** The need for personalized long-term SPC programs that integrate oral and systemic health, focusing on identifying and addressing factors affecting patient adherence, is underscored.
- d. **Education and clinical practices:** The consensus called for updates in dental education and clinical practices in LACC, advocating for the adoption of evidence-based, cost-effective, and feasible periodontal care strategies.
- e. **Public health policies:** A strong advocacy for comprehensive public health policies is made, emphasizing preventive measures, early interventions for periodontal health, and integration of oral health within overall health and healthy lifestyles.

Research gaps and future needs

- a. **Patient education and motivation strategies:** There is a critical gap in understanding the best patient education and motivation strategies for effective oral hygiene maintenance in LACC. Current research indicates a need for more innovative approaches beyond traditional methods. Future research should explore interdisciplinary strategies, incorporating insights from psychology, sociology, and education, to develop more effective patient communication and educational models tailored for LACC. This could include digital health

interventions, community-based programs, and culturally tailored educational materials that resonate with diverse populations.

- b. **Long-term outcomes of periodontal treatment in LACC:** There is also a significant lack of data regarding the long-term outcomes of various periodontal treatments, especially in diverse socioeconomic and cultural settings. This gap hinders the development of tailored treatment protocols and public health policies. Future research should focus on longitudinal studies that track the efficacy of different periodontal interventions in LACC over extended periods. These studies should consider a range of variables, including patient demographics, socio-economic status, access to healthcare, and cultural attitudes toward oral health.
- c. **Socio-economic disparities in LACC periodontal healthcare:** Lastly, there's an urgent need to address the socio-economic disparities that affect periodontal healthcare and its outcomes in LACC. Research should explore how these disparities influence access to and the efficacy of periodontal care. This includes understanding barriers to accessing care, such as cost, availability of services, and patient awareness, and developing strategies to overcome these challenges.

Recommendations

- a. **Implement comprehensive care:** Adopt a holistic approach to periodontal treatment, tailored to each patient, integrating individual risk factor management with non-surgical and surgical treatments - the latter as required, and ongoing SPC.
- b. **Enhance patient involvement:** Foster a deeper engagement of patients in their periodontal treatment, underscoring the essential role of managing biofilm effectively and controlling risk factors. This should involve a synergistic approach that combines home-care practices with professional dental interventions.
- c. **Personalize SPC programs:** Develop tailored, long-term SPC programs that integrate oral and

Strategies for managing periodontitis in daily practice

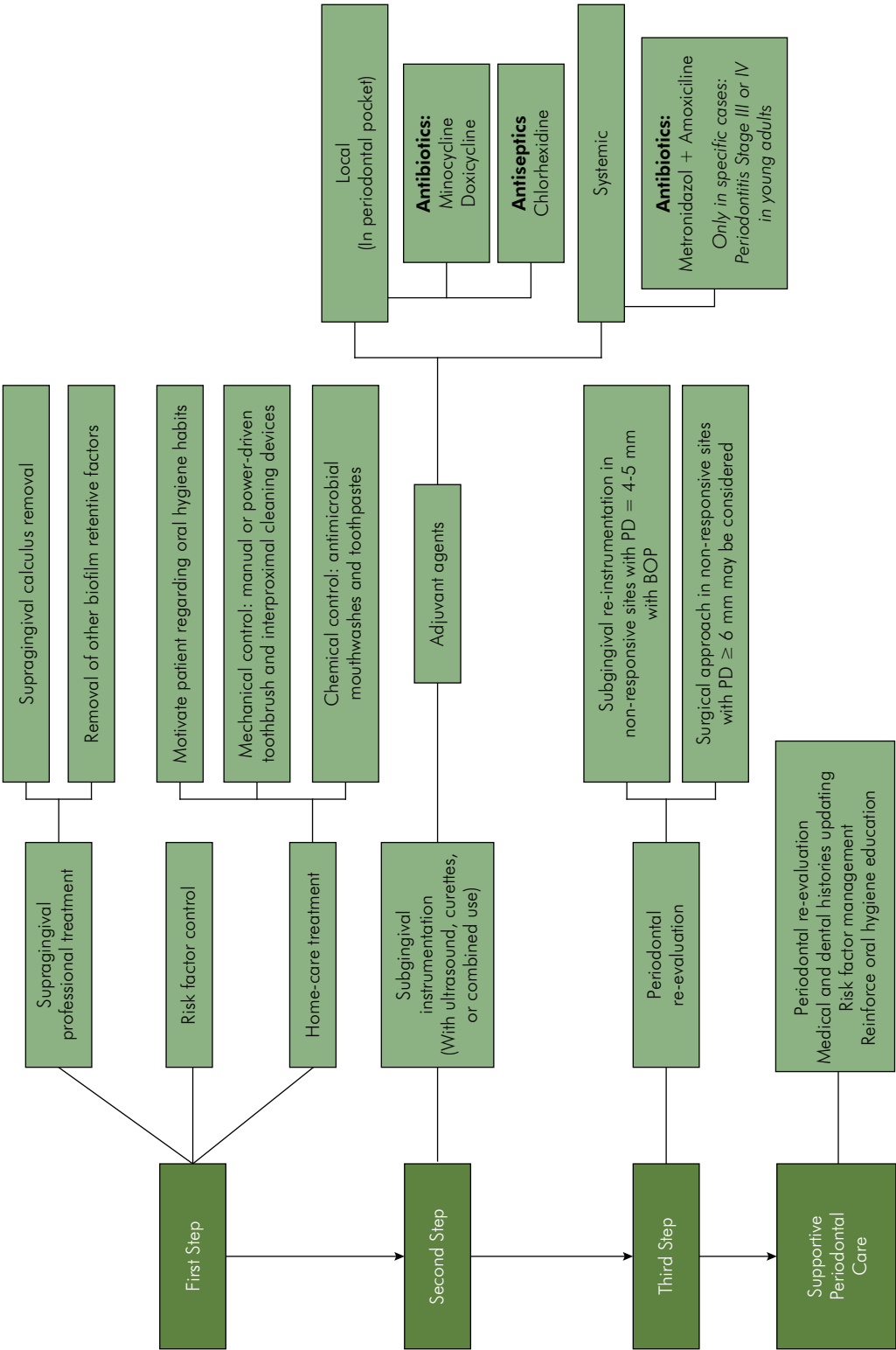


Figure. Strategies for managing periodontitis.

systemic health, focusing on identifying and addressing factors that affect patient adherence.

- d. **Revamp education and clinical practices:** Call for updates in dental education and clinical practice in LACC to reflect the region's specific needs and realities. This includes adopting evidence-based, cost-effective, and feasible periodontal care strategies.
- e. **Enhance public health policies:** Strongly advocate for developing and enhancing comprehensive public health policies. These policies should be broad-ranging and inclusive, focusing on preventive measures and early interventions for periodontal health and

integrating oral health within the broader context of overall health and healthy lifestyles.

Acknowledgments

This manuscript was prepared for the consensus titled "Latin America and Caribbean Periodontics Consensus 2024" organized by the Latin American Oral Health Association (LAOHA). The consensus process actively engaged experts from across the region, and the broader community was invited to review and contribute to the content. The resulting Consensus Report was derived from this paper. We would like to acknowledge the Colgate Palmolive Company for their support.

References

1. Sanz M, Herrera D, Kebschull M, Chapple I, Jepsen S, Beglundh T, et al. Treatment of stage I-III periodontitis-The EFP S3 level clinical practice guideline. *J Clin Periodontol*. 2020 Jul;47(Suppl 22 Suppl 22):4-60. <https://doi.org/10.1111/jcpe.13290>
2. Valkenburg C, Van der Weijden FA, Slot DE. Plaque control and reduction of gingivitis: the evidence for dentifrices. *Periodontol 2000*. 2019 Feb;79(1):221-32. <https://doi.org/10.1111/prd.12257>
3. Sälzer S, Graetz C, Dörfer CE, Slot DE, Van der Weijden FA. Contemporary practices for mechanical oral hygiene to prevent periodontal disease. *Periodontol 2000*. 2020 Oct;84(1):35-44. <https://doi.org/10.1111/prd.12332>
4. Joshi S, Suominen AL, Knuuttila M, Bernabé E. Toothbrushing behaviour and periodontal pocketing: an 11-year longitudinal study. *J Clin Periodontol*. 2018 Feb;45(2):196-203. <https://doi.org/10.1111/jcpe.12844>
5. Hellstadius K, Åsman B, Gustafsson A. Improved maintenance of plaque control by electrical toothbrushing in periodontitis patients with low compliance. *J Clin Periodontol*. 1993 Apr;20(4):235-7. <https://doi.org/10.1111/j.1600-051X.1993.tb00350.x>
6. Costa MR, Silva VC, Miqui MN, Sakima T, Spolidorio DM, Cirelli JA. Efficacy of ultrasonic, electric and manual toothbrushes in patients with fixed orthodontic appliances. *Angle Orthod*. 2007 Mar;77(2):361-6. [https://doi.org/10.2319/0003-3219\(2007\)077\[0361:EOUEAM\]2.0.CO;2](https://doi.org/10.2319/0003-3219(2007)077[0361:EOUEAM]2.0.CO;2)
7. Costa MR, Silva VC, Miqui MN, Colombo AP, Cirelli JA. Effects of ultrasonic, electric, and manual toothbrushes on subgingival plaque composition in orthodontically banded molars. *Am J Orthod Dentofacial Orthop*. 2010 Feb;137(2):229-35. <https://doi.org/10.1016/j.ajodo.2008.03.032>
8. Yaacob M, Worthington HV, Deacon SA, Deery C, Walmsley AD, Robinson PG, et al. Powered versus manual toothbrushing for oral health. *Cochrane Database Syst Rev*. 2014 Jun;2014(6):CD002281. <https://doi.org/10.1002/14651858.CD002281.pub3>
9. Thomassen TM, Van der Weijden FG, Slot DE. The efficacy of powered toothbrushes: a systematic review and network meta-analysis. *Int J Dent Hyg*. 2022 Feb;20(1):3-17. <https://doi.org/10.1111/idh.12563>
10. Chapple ILC, Van Der Weijden F, Doerfer C, Herrera D, Shapira L, Polak D, et al. Primary prevention of periodontitis: Managing gingivitis. *J Clin Periodontol*. 2015 Apr;42(16):S76. <https://doi.org/10.1111/jcpe.12366>
11. Haas AN, Prado R, Rios FS, Costa RD, Angst PD, Moura MD, et al. Occurrence and predictors of gingivitis and supragingival calculus in a population of Brazilian adults. *Braz Oral Res*. 2019 May;33:e036. <https://doi.org/10.1590/1807-3107bor-2019.vol33.0036>
12. Carra MC, Detzen L, Kitzmann J, Woelber JP, Ramseier CA, Bouchard P. Promoting behavioural changes to improve oral hygiene in patients with periodontal diseases: systematic review. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):72-89. <https://doi.org/10.1111/jcpe.13234>
13. Gomes SC, Romagna R, Rossi V, Corvello PC, Angst PD. Supragingival treatment as an aid to reduce subgingival needs: a 450-day investigation. *Braz Oral Res*. 2014;28(1):1-7. <https://doi.org/10.1590/S1806-83242014.50000004>
14. Ximénez-Fyvie LA, Haffajee AD, Som S, Thompson M, Torresyap G, Socransky SS. The effect of repeated professional supragingival plaque removal on the composition of the supra- and subgingival microbiota. *J Clin Periodontol*. 2000 Sep;27(9):637-47. <https://doi.org/10.1034/j.1600-051x.2000.027009637.x>

15. Murray EW, Williams C, Christiansen BA, Fiore MC, Baker TB, Bailey WC, et al.; Clinical Practice Guideline Treating Tobacco Use and Dependence 2008 Update Panel, Liaisons, and Staff. A clinical practice guideline for treating tobacco use and dependence: 2008 update. A U.S. Public Health Service report. *Am J Prev Med.* 2008 Aug;35(2):158-76. <https://doi.org/10.1016/j.amepre.2008.04.009>
16. Souto ML, Carrer FC, Braga MM, Pannuti CM. Smoking Cessation therapy is a cost-effective intervention to avoid tooth loss in Brazilian subjects with periodontitis: an economic evaluation. *BMC Oral Health.* 2021 Dec;21(1):616. <https://doi.org/10.1186/s12903-021-01932-2>
17. Rosa EF, Corraini P, Inoue G, Gomes EF, Guglielmetti MR, Sanda SR, et al. Effect of smoking cessation on non-surgical periodontal therapy: results after 24 months. *J Clin Periodontol.* 2014 Dec;41(12):1145-53. <https://doi.org/10.1111/jcpe.12313>
18. Souto ML, Rovai ES, Villar CC, Braga MM, Pannuti CM. Effect of smoking cessation on tooth loss: a systematic review with meta-analysis. *BMC Oral Health.* 2019 Nov;19(1):245. <https://doi.org/10.1186/s12903-019-0930-2>
19. Warnakulasuriya S, Dietrich T, Bornstein MM, Casals Peidró E, Preshaw PM, Walter C, et al. Oral health risks of tobacco use and effects of cessation. *Int Dent J.* 2010 Feb;60(1):7-30. https://doi.org/10.1922/IDJ_2532Warnakulasuriya24
20. Inoue G, Rosa EF, Gomes EF, Guglielmetti MR, Corraini P, Takano RK, et al. Predictors of smoking cessation in smokers with chronic periodontitis: a 24-month study. *Braz Oral Res.* 2016 Oct;30(1):e98. <https://doi.org/10.1590/1807-3107BOR-2016.vol30.0098>
21. Ramseier CA, Woelber JP, Kitzmann J, Detzen L, Carra MC, Bouchard P. Impact of risk factor control interventions for smoking cessation and promotion of healthy lifestyles in patients with periodontitis: a systematic review. *J Clin Periodontol.* 2020 Jul;47(22 Suppl 22):90-106. <https://doi.org/10.1111/jcpe.13240>
22. Chan CC, Chan AK, Chu CH, Tsang YC. Physical activity as a modifiable risk factor for periodontal disease. *Front Oral Health.* 2023 Nov;4:1266462. <https://doi.org/10.3389/froh.2023.1266462>
23. Herrera D, Sanz M, Kekschull M, Jepsen S, Sculean A, Berglundh T, et al.; EFP Workshop Participants and Methodological Consultant. Treatment of stage IV periodontitis: the EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2022 Jun;49(S24 Suppl 24):4-71. <https://doi.org/10.1111/jcpe.13639>
24. Cobb CM. Clinical significance of non-surgical periodontal therapy: an evidence-based perspective of scaling and root planing. *J Clin Periodontol.* 2002 May;29(s2 Suppl 2):6-16. <https://doi.org/10.1034/j.1600-051X.29.s2.4.x>
25. Van der Weijden GA, Timmerman MF. A systematic review on the clinical efficacy of subgingival debridement in the treatment of chronic periodontitis. *J Clin Periodontol.* 2002;29(s3 Suppl 3):55-71. <https://doi.org/10.1034/j.1600-051X.29.s3.3.x>
26. Smiley CJ, Tracy SL, Abt E, Michalowicz BS, John MT, Gunsolley J, et al. Systematic review and meta-analysis on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts. *J Am Dent Assoc.* 2015 Jul;146(7):508-24.e5. <https://doi.org/10.1016/j.adaj.2015.01.028>
27. Cortellini P, Stalpers G, Molloy A, Tonetti MS. Periodontal regeneration versus extraction and dental implant or prosthetic replacement of teeth severely compromised by attachment loss to the apex: A randomized controlled clinical trial reporting 10-year outcomes, survival analysis and mean cumulative cost of recurrence. *J Clin Periodontol.* 2020 Jun;47(6):768-76. <https://doi.org/10.1111/jcpe.13289>
28. Citterio F, Gualini G, Chang M, Piccoli GM, Giraudi M, Manavella V, et al. Pocket closure and residual pockets after non-surgical periodontal therapy: A systematic review and meta-analysis. *J Clin Periodontol.* 2022 Jan;49(1):2-14. <https://doi.org/10.1111/jcpe.13547>
29. Feres M, Soares GM, Mendes JA, Silva MP, Faveri M, Teles R, et al. Metronidazole alone or with amoxicillin as adjuncts to non-surgical treatment of chronic periodontitis: a 1-year double-blinded, placebo-controlled, randomized clinical trial. *J Clin Periodontol.* 2012 Dec;39(12):1149-58. <https://doi.org/10.1111/jcpe.12004>
30. Mestnik MJ, Feres M, Figueiredo LC, Soares G, Teles RP, Fermiano D, et al. The effects of adjunctive metronidazole plus amoxicillin in the treatment of generalized aggressive periodontitis: a 1-year double-blinded, placebo-controlled, randomized clinical trial. *J Clin Periodontol.* 2012 Oct;39(10):955-61. <https://doi.org/10.1111/j.1600-051X.2012.01932.x>
31. Gonçalves TE, Feres M, Zimmermann GS, Faveri M, Figueiredo LC, Braga PG, et al. Effects of scaling and root planing on clinical response and serum levels of adipocytokines in patients with obesity and chronic periodontitis. *J Periodontol.* 2015 Jan;86(1):53-61. <https://doi.org/10.1902/jop.2014.140266>
32. Morales A, Carvajal P, Silva N, Hernandez M, Godoy C, Rodriguez G, et al. Clinical effects of *Lactobacillus rhamnosus* in non-surgical treatment of chronic periodontitis: A randomized placebo-controlled trial with 1-year follow-up. *J Periodontol.* 2016 Aug;87(8):944-52. <https://doi.org/10.1902/jop.2016.150665>
33. Graziani F, Karapetsa D, Alonso B, Herrera D. Nonsurgical and surgical treatment of periodontitis: how many options for one disease? *Periodontol 2000.* 2017 Oct;75(1):152-88. <https://doi.org/10.1111/prd.12201>
34. Suvan J, Leira Y, Moreno Sancho FM, Graziani F, Derks J, Tomasi C. Subgingival instrumentation for treatment of periodontitis. A systematic review. *J Clin Periodontol.* 2020 Jul;47(22 Suppl 22):155-75. <https://doi.org/10.1111/jcpe.13245>
35. Cláudio MM, Nuernberg MA, Rodrigues JV, Belizário LC, Batista JA, Duque C, et al. Effects of multiple sessions of antimicrobial photodynamic therapy (aPDT) in the treatment of periodontitis in patients with uncompensated type 2 diabetes: A randomized controlled clinical study. *Photodiagnosis Photodyn Ther.* 2021 Sep;35:102451. <https://doi.org/10.1016/j.pdpdt.2021.102451>

36. Salvi GE, Stähli A, Schmidt JC, Ramseier CA, Sculean A, Walter C. Adjunctive laser or antimicrobial photodynamic therapy to non-surgical mechanical instrumentation in patients with untreated periodontitis: a systematic review and meta-analysis. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):176-98. <https://doi.org/10.1111/jcpe.13236>
37. Donos N, Calciolari E, Brusselaers N, Goldoni M, Bostanci N, Belibasakis GN. The adjunctive use of host modulators in non-surgical periodontal therapy: a systematic review of randomized, placebo-controlled clinical studies. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):199-238. <https://doi.org/10.1111/jcpe.13232>
38. Herrera D, Matesanz P, Martín C, Oud V, Feres M, Teughels W. Adjunctive effect of locally delivered antimicrobials in periodontitis therapy: a systematic review and meta-analysis. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):239-56. <https://doi.org/10.1111/jcpe.13230>
39. Gegout PY, Stutz C, Huck O. Gels as adjuvant to non-surgical periodontal therapy: A systematic review and meta-analysis. *Heliyon*. 2023 Jul;9(7):e17789. <https://doi.org/10.1016/j.heliyon.2023.e17789>
40. Costa LF, Amaral CD, Barbirato DD, Leão AT, Fogacci MF. Chlorhexidine mouthwash as an adjunct to mechanical therapy in chronic periodontitis: A meta-analysis. *J Am Dent Assoc*. 2017 May;148(5):308-18. <https://doi.org/10.1016/j.adaj.2017.01.021>
41. Faveri M, Gursky LC, Feres M, Shibli JA, Salvador SL, Figueiredo LC. Scaling and root planing and chlorhexidine mouthrinses in the treatment of chronic periodontitis: a randomized, placebo-controlled clinical trial. *J Clin Periodontol*. 2006 Nov;33(11):819-28. <https://doi.org/10.1111/j.1600-051X.2006.00994.x>
42. Feres M, Gursky LC, Faveri M, Tsuzuki CO, Figueiredo LC. Clinical and microbiological benefits of strict supragingival plaque control as part of the active phase of periodontal therapy. *J Clin Periodontol*. 2009 Oct;36(10):857-67. <https://doi.org/10.1111/j.1600-051X.2009.01471.x>
43. Fonseca DC, Cortelli JR, Cortelli SC, Cota LOM, Costa LCM, Castro MVM, et al. Clinical and microbiologic evaluation of scaling and root planing per quadrant and one-stage full-mouth disinfection associated with azithromycin or chlorhexidine: a Clinical randomized controlled trial. *J Periodontol*. 2015 Dec;86(12):1340-51. <https://doi.org/10.1902/jop.2015.150227>
44. Teughels W, Feres M, Oud V, Martín C, Matesanz P, Herrera D. Adjunctive effect of systemic antimicrobials in periodontitis therapy: a systematic review and meta-analysis. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):257-81. <https://doi.org/10.1111/jcpe.13264>
45. Retamal-Valdes B, Tavares AP, Monique S, Silva HDP, Mestnik MJ, Duarte PM, et al. Adverse events of metronidazole and amoxicillin: retrospective analysis of a large data set of five randomized clinical trials. *J Clin Periodontol*. 2022 Nov;49(11):1121-32. <https://doi.org/10.1111/jcpe.13704>
46. Pini Prato GP, Di Gianfilippo R, Wang HL. Success in periodontology: an evolutive concept. *J Clin Periodontol*. 2019 Aug;46(8):840-5. <https://doi.org/10.1111/jcpe.13150>
47. Sanz-Sánchez I, Montero E, Citterio F, Romano F, Molina A, Aimetti M. Efficacy of access flap procedures compared to subgingival debridement in the treatment of periodontitis: a systematic review and meta-analysis. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):282-302. <https://doi.org/10.1111/jcpe.13259>
48. Ribeiro FV, Casarin RC, Palma MA, Júnior FH, Sallum EA, Casati MZ. Clinical and patient-centered outcomes after minimally invasive non-surgical or surgical approaches for the treatment of intrabony defects: a randomized clinical trial. *J Periodontol*. 2011 Sep;82(9):1256-66. <https://doi.org/10.1902/jop.2011.100680>
49. Lindhe J, Westfelt E, Nyman S, Socransky SS, Heijl L, Bratthall G. Healing following surgical/non-surgical treatment of periodontal disease: a clinical study. *J Clin Periodontol*. 1982 Mar;9(2):115-28. <https://doi.org/10.1111/j.1600-051X.1982.tb01227.x>
50. Lindhe J, Nyman S. Scaling and granulation tissue removal in periodontal therapy. *J Clin Periodontol*. 1985 May;12(5):374-88. <https://doi.org/10.1111/j.1600-051X.1985.tb00928.x>
51. Wennström A, Wennström J, Lindhe J. Healing following surgical and non-surgical treatment of juvenile periodontitis: a 5-year longitudinal study. *J Clin Periodontol*. 1986 Oct;13(9):869-82. <https://doi.org/10.1111/j.1600-051X.1986.tb02245.x>
52. Becker W, Becker BE, Caffesse R, Kerry G, Ochsenbein C, Morrison E, et al. A longitudinal study comparing scaling, osseous surgery, and modified Widman procedures: results after 5 years. *J Periodontol*. 2001 Dec;72(12):1675-84. <https://doi.org/10.1902/jop.2001.72.12.1675>
53. Serino G, Rosling B, Ramberg P, Socransky SS, Lindhe J. Initial outcome and long-term effect of surgical and non-surgical treatment of advanced periodontal disease. *J Clin Periodontol*. 2001 Oct;28(10):910-6. <https://doi.org/10.1034/j.1600-051x.2001.028010910.x>
54. Polak D, Wilensky A, Antonoglou GN, Shapira L, Goldstein M, Martin C. The efficacy of pocket elimination/reduction compared to access flap surgery: a systematic review and meta-analysis. *J Clin Periodontol*. 2020 Jul;47(S22 Suppl 22):303-19. <https://doi.org/10.1111/jcpe.13246>
55. Nibali L, Sultan D, Arena C, Pelekos G, Lin GH, Tonetti M. Periodontal infrabony defects: systematic review of healing by defect morphology following regenerative surgery. *J Clin Periodontol*. 2021 Jan;48(1):100-13. <https://doi.org/10.1111/jcpe.13381>

56. Cimdões R, Santiago LM, Caldas Júnior AF, Vajgel BCF, Perussolo J, Donos N. Treatment of intrabony periodontal defects in controlled diabetic patients with an enamel matrix derivative: a split-mouth randomized clinical trial. *Clin Oral Investig*. 2022 Mar;26(3):2479-89. <https://doi.org/10.1007/s00784-021-04215-w>
57. Miremadi SR, De Bruyn H, Steyaert H, Princen K, Sabzevar MM, Cosyn J. A randomized controlled trial on immediate surgery versus root planing in patients with advanced periodontal disease: a cost-effectiveness analysis. *J Clin Periodontol*. 2014 Feb;41(2):164-71. <https://doi.org/10.1111/jcpe.12201>
58. Pelucio JB, Pontes CB, Pereira SL. Profile of the periodontal basic therapy service in the health care strategy. *Periodontia*. 2020;30(3):32-42.
59. Laroque MB, Fassa ACG, Castilhos ED. Evaluation of secondary dental health care at the Dental Specialties Centre, Pelotas, Rio Grande do Sul, Brazil, 2012-2013. *Epidemiol Serv Saúde*. 2015 Jul-Sep; 24(3):421-30. <https://doi.org/10.5123/S1679-49742015000300008>
60. Angst PD, Finger Stadler A, Mendez M, Oppermann RV, van der Velden U, Gomes SC. Supportive periodontal therapy in moderate-to-severe periodontitis patients: a two-year randomized clinical trial. *J Clin Periodontol*. 2019 Nov;46(11):1083-93. <https://doi.org/10.1111/jcpe.13178>
61. Stewart B, Shibli JA, Araujo M, Figueiredo LC, Panagakos F, Matarazzo F, et al. Effects of a toothpaste containing 0.3% triclosan on periodontal parameters of subjects enrolled in a regular maintenance program: a secondary analysis of a 2-year randomized clinical trial. *J Periodontol*. 2020 May;91(5):596-605. <https://doi.org/10.1002/JPER.18-0501>
62. Matulienė G, Studer R, Lang NP, Schmidlin K, Pjetursson BE, Salvi GE, et al. Significance of periodontal risk assessment in the recurrence of periodontitis and tooth loss. *J Clin Periodontol*. 2010 Feb;37(2):191-9. <https://doi.org/10.1111/j.1600-051X.2009.01508.x>
63. Trombelli L, Minenna L, Toselli L, Zaetta A, Checchi L, Checchi V, et al. Prognostic value of a simplified method for periodontal risk assessment during supportive periodontal therapy. *J Clin Periodontol*. 2017 Jan;44(1):51-7. <https://doi.org/10.1111/jcpe.12645>
64. Ueda PH, Casati MZ, Casarin RC, Pera C, Pimentel SP, Cirano FR. Supportive periodontal treatment and full-mouth ultrasonic debridement: a randomised controlled clinical trial. *Oral Health Prev Dent*. 2014;12(4):323-9. <https://doi.org/10.3290/j.ohpd.a31664>
65. Ravidà A, Galli M, Saleh MH, Rodriguez MV, Qazi M, Troiano G, et al. Maintenance visit regularity has a different impact on periodontitis-related tooth loss depending on patient staging and grading. *J Clin Periodontol*. 2021 Aug;48(8):1008-18. <https://doi.org/10.1111/jcpe.13489>
66. Campos IS, de Freitas MR, Costa FO, Cortelli SC, Rovai ES, Cortelli JR. The effects of patient compliance in supportive periodontal therapy on tooth loss: a systematic review and meta-analysis. *J Int Acad Periodontol*. 2021 Jan;23(1):17-30.
67. Costa FO, Miranda Cota LO, Pereira Lages EJ, Vilela Câmara GC, Cortelli SC, Cortelli JR, et al. Oral impact on daily performance, personality traits, and compliance in periodontal maintenance therapy. *J Periodontol*. 2011 Aug;82(8):1146-54. <https://doi.org/10.1902/jop.2011.100515>
68. Costa FO, Lages EJ, Cota LO, Lorentz TC, Soares RV, Cortelli JR. Tooth loss in individuals under periodontal maintenance therapy: 5-year prospective study. *J Periodontol Res*. 2014 Feb;49(1):121-8. <https://doi.org/10.1111/jre.12087>
69. Novaes AB Jr, de Lima FR, Novaes AB. Compliance with supportive periodontal therapy and its relation to the bleeding index. *J Periodontol*. 1996 Oct;67(10):976-80. <https://doi.org/10.1902/jop.1996.67.10.976>
70. Checchi L, Montecchi M, Gatto MR, Trombelli L. Retrospective study of tooth loss in 92 treated periodontal patients. *J Clin Periodontol*. 2002 Jul;29(7):651-6. <https://doi.org/10.1034/j.1600-051X.2002.290710.x>
71. Echeverría JJ, Echeverría A, Caffesse RG. Adherence to supportive periodontal treatment. *Periodontol 2000*. 2019 Feb;79(1):200-9. <https://doi.org/10.1111/prd.12256>
72. Novaes AB Jr, Novaes AB. Compliance with supportive periodontal therapy. Part II: risk of non-compliance in a 10-year period. *Braz Dent J*. 2001;12(1):47-50.
73. Novaes AB Jr, Novaes AB, Bustamanti A, Villavicencio JJ, Muller E, Pulido J. Supportive periodontal therapy in South America. A retrospective multi-practice study on compliance. *J Periodontol*. 1999 Mar;70(3):301-6. <https://doi.org/10.1902/jop.1999.70.3.301>
74. Carvalho R, Botelho J, Machado V, Mascarenhas P, Alcoforado G, Mendes JJ, et al. Predictors of tooth loss during long-term periodontal maintenance: an updated systematic review. *J Clin Periodontol*. 2021 Aug;48(8):1019-36. <https://doi.org/10.1111/jcpe.13488>
75. Siow DS, Goh EX, Ong MM, Preshaw PM. Risk factors for tooth loss and progression of periodontitis in patients undergoing periodontal maintenance therapy. *J Clin Periodontol*. 2023 Jan;50(1):61-70. <https://doi.org/10.1111/jcpe.13721>
76. Costa FO, Cortelli JR, Cortelli SC, Costa AA, Lima RPE, Costa AM, et al. The loss of molars in supportive periodontal care: A 10-year follow-up for tooth- and patient-related factors. *J Clin Periodontol*. 2022 Mar;49(3):292-300. <https://doi.org/10.1111/jcpe.13585>
77. Agudio G, Buti J, Bonaccini D, Pini Prato G, Cortellini P. Longevity of teeth in patients susceptible to periodontitis: clinical outcomes and risk factors associated with tooth loss after active therapy and 30 years of supportive periodontal care. *J Clin Periodontol*. 2023 Apr;50(4):520-32. <https://doi.org/10.1111/jcpe.13770>

78. Bertl K, Pandis N, Stopfer N, Haririan H, Bruckmann C, Stavropoulos A. The impact of a “successfully treated stable periodontitis patient status” on patient-related outcome parameters during long-term supportive periodontal care. *J Clin Periodontol*. 2022 Feb;49(2):101-10. <https://doi.org/10.1111/jcpe.13582>
79. Leow NM, Moreno F, Marletta D, Hussain SB, Buti J, Almond N, et al. Recurrence and progression of periodontitis and methods of management in long-term care: A systematic review and meta-analysis. *J Clin Periodontol*. 2022 Jun;49(S24 Suppl 24):291-313. <https://doi.org/10.1111/jcpe.13553>
80. Lorentz TC, Cota LO, Cortelli JR, Vargas AM, Costa FO. Tooth loss in individuals under periodontal maintenance therapy: prospective study. *Braz Oral Res*. 2010;24(2):231-7. <https://doi.org/10.1590/S1806-83242010000200017>
81. Costa FO, Miranda Cota LO, Pereira Lages EJ, Soares Dutra Oliveira AM, Dutra Oliveira PA, Cyrino RM, et al. Progression of periodontitis and tooth loss associated with glycemic control in individuals undergoing periodontal maintenance therapy: a 5-year follow-up study. *J Periodontol*. 2013 May;84(5):595-605. <https://doi.org/10.1902/jop.2012.120255>
82. Costa FO, Cota LO, Cortelli JR, Cortelli SC, Cyrino RM, Lages EJ, et al. Surgical and non-surgical procedures associated with recurrence of periodontitis in periodontal maintenance therapy: 5-year prospective study. *PLoS One*. 2015 Oct;10(10):e0140847. <https://doi.org/10.1371/journal.pone.0140847>
83. Costa FO, Cortelli JR, Lima RP, Costa AA, Cortelli SC, Cota LO. Depressive disorders associated with the recurrence of periodontitis in periodontal maintenance. *J Int Acad Periodontol*. 2020 Apr;22(2):1-9.
84. Costa FO, Cortelli JR, Costa AM, Lima RP, Corteli SC, Cota OM. Periodontal condition and recurrence of periodontitis associated with alcohol consumption in periodontal maintenance therapy. *J Clin Exp Dent*. 2020b Feb;12(2):e139-47. <https://doi.org/10.4317/jced.56166>
85. Saleh MH, Decker A, Ravidà A, Wang HL, Tonetti M. Periodontitis stage and grade modifies the benefit of regular supportive periodontal care in terms of need for retreatment and mean cumulative cost. *J Clin Periodontol*. 2024 Feb;51(2):167-76. <https://doi.org/10.1111/jcpe.13909>
86. Costa FO, Santuchi CC, Lages EJ, Cota LO, Cortelli SC, Cortelli JR, et al. Prospective study in periodontal maintenance therapy: comparative analysis between academic and private practices. *J Periodontol*. 2012 Mar;83(3):301-11. <https://doi.org/10.1902/jop.2011.110101>

Cristina Cunha VILLAR^(a) 
Paola CARVAJAL^(b) 
Fernanda CARRER^(c) 
Giuseppe Alexandre ROMITO^(a) 
James Rudolph COLLINS^(d) 
Marco Antonio ALARCÓN^(e) 
Cassiano Kuchenbecker RÖSING^(f) 
Juliano CAVAGNI^(g) 
Andres Duque DUQUE^(g) 
Gloria Inés LAFAURIE Villamil^(h) 
Ricardo Guimarães FISCHER⁽ⁱ⁾ 
Bernal STEWART^(i,k) 
Zilson MALHEIROS^(i,k) 
Carlos BENÍTEZ^(i,k) 
Claudio Mendes PANNUTI^(a) 

^(a)Universidade de São Paulo – USP, School of Dentistry, Department of Periodontics, São Paulo, SP, Brazil.

^(b)Universidad de Chile, School of Dentistry, Department of Conservative Dentistry, Santiago, Chile.

^(c)Universidade de São Paulo – USP, School of Dentistry, Department of Community Dentistry, São Paulo, SP, Brazil.

^(d)Pontificia Universidad Católica Madre y Maestra, School of Dentistry, Department of Periodontology, Santo Domingo, Republica Dominicana.

^(e)Universidad Peruana Cayetano Heredia, Academic Department of Clinical Stomatology, Lima, Perú.

^(f)Universidade Federal do Rio Grande do Sul – UFRGS, Faculty of Dentistry, Department of Periodontology, Porto Alegre, RS, Brazil.

^(g)CES University, School of Dentistry, Department of Periodontics, Medellín, Colombia.

^(h)Universidad El Bosque, School of Dentistry, Unit of Basic Oral Investigation, Bogotá, Colombia.

⁽ⁱ⁾Pontificia Universidade Católica do Rio de Janeiro – PUCRS, School of Dentistry, Department of Periodontics, Rio de Janeiro, RJ, Brazil.

^(k)Latin American Oral Health Association – LAOHA, São Paulo, SP, Brazil.

^(*)Colgate-Palmolive Company, Colgate Technology Center, Piscataway, NJ, USA.

Declaration of Interests: Bernal Stewart, Zilson M. Malheiros and Carlos Benítez are Colgate-Palmolive employees.

Corresponding Author:
Cristina Cunha Villar
E-mail: villar@usp.br

<https://doi.org/10.1590/1807-3107bor-2024.vol38.0122>

Submitted: July 30, 2024
Accepted for publication: August 1, 2024
Last revision: August 14, 2024

Final recommendations for the Latin America and Caribbean Periodontics Consensus 2024

Abstract: The 2024 Consensus on Periodontology for Latin America and the Caribbean addresses the significant public health issue of periodontal diseases, impacting millions in the region. This comprehensive document presents holistic recommendations to standardize diagnostic methodologies, enhance public awareness, and integrate preventive and therapeutic practices into general healthcare. Key areas include understanding the prevalence and impact of periodontal diseases, identifying risk factors, and improving diagnostic, preventive, and treatment strategies. The consensus emphasizes interdisciplinary collaboration, tailored public health interventions, and the importance of continuous monitoring and research. By unifying efforts across various sectors, the consensus aims to reduce the burden of periodontal diseases, thereby improving both oral and general health outcomes in Latin America and the Caribbean.

Keywords: Periodontal Diseases; Public Health; Latin America; Caribbean Region; Prevalence; Risk Factors; Diagnosis.

Introduction

The 2024 Consensus on Periodontology for Latin America and the Caribbean represents a landmark endeavor to systematically address periodontal disease, a significant public health issue impacting millions in the region. Developed by the concerted efforts of expert stakeholders, this consensus aims to unify and enhance periodontal health practices, research, and public awareness, by laying out a set of holistic recommendations. These guidelines advocate for standardized methodologies, increased public awareness, and the integration of diagnostic, preventive, and therapeutic practices into general healthcare, alongside a push for research and education to empower dental professionals. By addressing these areas in a focused and collaborative approach, the consensus aims to significantly reduce the burden of periodontal diseases, thereby improving both oral and general health across Latin America and the Caribbean. The following recommendations were established based on the content of the six consensus papers:¹⁻⁶

Prevalence of Periodontal Diseases

Standardize examination methodologies

Advocate for the adoption of standardized methodologies and case definitions for periodontal disease across epidemiological research studies to ensure comparability and enhance the understanding of disease prevalence and trends. Develop and disseminate a training module for epidemiological surveys including periodontal disease assessment to achieve consistency in periodontal disease assessment across studies, observing WHO guidelines.⁷

Establish a regional expert panel

Form a panel of regional experts tasked with the periodic review and update of case definitions and diagnostic criteria for periodontal diseases, ensuring alignment with global standards while accounting for regional variations.

Implement a standardized surveillance framework

Introduce a standardized framework for periodontal disease surveillance that includes specific indicators for ongoing monitoring and evaluation efforts, with the aim of capturing accurate prevalence data.

Promote multicenter studies and collaboration

Encourage the development of national oral health surveillance systems and foster international collaborations for multicenter studies. These initiatives will contribute to a deeper understanding of the epidemiology of periodontal diseases within the region.

Create a regional consortium for periodontal research

Establish a consortium to support resource sharing, methodological alignment, and data pooling.

Additionally, launch a database for periodontal health to facilitate collaboration and informed decision-making.

Obtain support for research

Seek funding and logistical backing for multicenter studies by means of partnerships with global health organizations, government agencies, and the private sector, with the aim of bolstering research infrastructure for periodontal disease.

Prioritize underrepresented populations in research

Increase research efforts targeting underrepresented groups, such as rural and indigenous communities, by using culturally sensitive methodologies to ensure accurate and comprehensive data collection. Develop programs to engage underrepresented populations in oral health research and interventions, thereby enhancing community participation and data collection efforts across diverse demographic groups.

Address socioeconomic and educational determinants

Emphasize the need for strategies that address the link between periodontal disease prevalence, socioeconomic and educational factors. Advocate for policy reforms that integrate oral health into the broader primary healthcare system, thereby promoting equitable access to care.

Enhance continuous monitoring and evaluation

Support the development of a regional oral health surveillance system to continuously monitor periodontal disease trends and the impact of public health interventions. Encourage the adoption of electronic health records and mobile health technologies for efficient data collection and analysis, with the aim of improving the overall management of, and prevention strategies for periodontal diseases.

Burden and Impact of Periodontal Diseases on Oral Health-Related Quality of Life and Systemic Diseases

Expand epidemiological research

Broaden the representation of epidemiological studies across LAC countries to better understand the relationship between periodontal diseases and Oral Health-Related Quality of Life (OHRQoL). These studies should focus on diverse cultural and socioeconomic contexts to provide a comprehensive view of periodontal health impacts.

Conduct longitudinal studies on periodontal health and systemic diseases

Encourage multicenter longitudinal studies to be conducted to investigate the associations and potential causative links between periodontitis and non-communicable diseases (NCDs), such as cardiovascular diseases, diabetes, and, respiratory conditions.

Address vulnerable populations

Direct research efforts towards assessing the impact of periodontal diseases on the quality of life among vulnerable groups, including those that are geographically isolated or with restricted access to dental care, those living in poverty and indigenous populations.

Evaluate the cost-effectiveness of periodontal interventions

Conduct intervention studies to assess the effectiveness and cost-efficiency⁸ of periodontal treatments in managing or mitigating systemic conditions.

Integrate oral health into general healthcare

Advocate for the integration of oral health assessments and periodontal disease management into the broader healthcare system. This includes training healthcare providers to recognize the systemic

implications of periodontal health and ensuring that oral health is considered an integral part of overall health and well-being.

Public health programs

Develop and disseminate targeted public health programs to raise awareness about the significant impact of periodontal diseases on quality of life and its association with systemic conditions.

Risk Factors of Periodontal Disease

Enhanced training on risk factors

Ensure that dental professionals, right from their undergraduate training onwards, receive proper training in identifying and managing key periodontal disease risk factors, with particular emphasis on smoking⁹ and diabetes.^{10,11} Dental education curricula should be updated to include in-depth coverage of risk factor management for periodontal disease. This includes training in conducting effective patient interviews and applying current evidence-based practices for risk factor modification.

Public awareness programs and policies

Implement widespread public health programs to increase awareness of the significant impact of smoking and poorly managed diabetes on periodontal health. By leveraging various media platforms and targeting both the general public and high-risk groups, these programs can play a crucial role in promoting early intervention and encouraging healthier lifestyles.

Integration of risk factor screening into dental evaluations

Advocate for the routine incorporation of risk factor screening for smoking and diabetes into dental evaluations, irrespective of the patient's initial reason for consultation. This approach can facilitate prompt and effective preventive measures and treatments.

Customize public health interventions

Develop and implement public health interventions that are specifically designed to reduce the prevalence of smoking and improve diabetes management in Latin American and Caribbean populations. Tailored approaches are necessary to address the unique challenges and circumstances of the region.

Promote interdisciplinary collaboration

Foster interdisciplinary collaboration between dental professionals and other healthcare specialists, such as endocrinologists and tobacco cessation specialists, to ensure a comprehensive approach to managing periodontal disease risk factors.

Longitudinal research

Encourage and support the conducting of longitudinal cohort studies within the region to increase elucidation of the causal relationships between smoking, diabetes, and periodontal disease.

Enhancing Periodontal Disease Diagnosis

Integrate training in diagnostics into dental education

Incorporate extensive training on periodontal disease diagnosis into dental education curricula, with emphasis on early detection and application of the AAP/EFP¹² classification. This initiative aims to equip new dental professionals with the knowledge necessary for effective diagnosis from the outset of their careers.

Launch public awareness programs

Execute targeted public awareness programs to raise knowledge about the signs and symptoms of periodontal diseases. Use culturally relevant media channels to ensure widespread outreach and impact, with the aim of empowering individuals with the knowledge to seek early treatment.

Promote validated self-report tools

Advocate for the use of validated self-report tools in both clinical settings and public health

initiatives. These tools are designed to help with early recognition of periodontal diseases by patients themselves, thereby facilitating timely professional consultation.

Standardize full-mouth periodontal examinations

Push for the adoption of full-mouth periodontal examinations as the standard diagnostic practice. Emphasize the limitations of partial recordings, which are not sufficient for comprehensive diagnosis and often lead to underdiagnosis.

Uniform application of AAP/EFP classification

Encourage the consistent use of the AAP/EFP classification system during periodontal clinical examinations. This practice will ensure accurate staging and grading of periodontitis, thus enabling the development of individualized treatment plans.

Enhance understanding of complementary diagnostic tests

Ensure dental professionals are thoroughly trained in the variety of diagnostic tests available for periodontal diseases, including imaging and laboratory tests. Focus on enhancing the effective application of these tests to improve diagnostic accuracy, according to the existing evidence about these tests.

Support research on innovative diagnostic methods

Advocate for ongoing research into innovative methods for periodontal disease diagnosis that offer accuracy and less invasiveness. Promote the adoption of these emerging technologies and tools in clinical practice upon their validation.

Comprehensive interviews and multidisciplinary collaboration

Provide dental practitioners with training on conducting in-depth interviews to explore systemic and behavioral risk factors for periodontal diseases. Encourage a multidisciplinary approach to care, by integrating insights from various health specialties into care

Strategies for the Prevention of Periodontal Disease and its Impact on General Health

Launch multifaceted awareness programs

Execute comprehensive programs across community settings such as schools, workplaces, and public spaces, using both traditional and digital media to highlight the risks and systemic health impacts of periodontal disease. Engage local influencers to extend the campaign reach and effectiveness.

Develop and Implement Evidence-based Guidelines (EBG)

Formulate EBG to advocate for periodontal health across all life stages, emphasizing risk management and adherence to lifestyle, according to the characteristics of the LAC countries. Involve a broad spectrum of stakeholders in EBG development and ensure accessibility by providing materials in various languages and formats suitable for all literacy levels.

Train dental professionals in patient communication

Equip dental professionals with the skills to effectively communicate the connection between oral health and overall wellness. Transform dental office waiting areas into educational hubs with resources such as videos, brochures, and interactive tools that promote healthy lifestyle choices.

Support research on innovative health promotion methods

Invest in studies exploring the impact of mobile health applications, tele-dentistry, and social media on oral health awareness and self-care. Focus on assessing how these technologies improve access to dental care by marginalized communities.

Incorporate oral health education into community programs

Integrate oral health education into schools and community initiatives, offering practical demonstrations on effective oral hygiene practices. Organize health fairs providing free dental screenings,

and educational workshops to emphasize the significance of oral hygiene.

Partner with dental product companies for resource distribution

Collaborate with companies to provide free or affordable oral hygiene products to populations in underprivileged areas. Advocate for the inclusion of oral health products in basic healthcare provisions and ensure the availability of products beneficial to managing advanced periodontal conditions.

Emphasize personalized oral hygiene education

Stress the importance of tailored oral hygiene instructions in professional development sessions for dental practitioners, catering to the diverse needs of patients including those with special needs.

Encourage longitudinal studies on the effectiveness of oral health strategies

Promote long-term research to evaluate the sustained impact of mechanical and chemical plaque control strategies. Focus on developing and testing oral hygiene products that cater to the region's diverse population and investigating the role of prebiotic diet and probiotics in periodontal health.

Develop integrated care programs for systemic and oral health

Create care models that integrate oral health assessments¹³ into routine check-ups for individuals with chronic diseases or during pregnancy. Offer training on the systemic implications of periodontal health for non-dental healthcare providers.

Foster a network of professionals with periodontal disease expertise

Establish a collaboration network among dental and medical professionals to share knowledge, research findings, and educational resources on periodontal and systemic health interrelations.

Build partnerships with patient associations

Work with patient organizations to spread information about periodontal disease prevention and its connection with systemic health,

customizing educational materials for the needs of different communities.

Support interdisciplinary research on preventive strategies

Back multicenter studies examining the effectiveness of periodontal disease prevention measures and their impact on systemic health, with the aim of disseminating information about comprehensive public health policies and clinical guidelines.

Treatment of Periodontal Diseases

Integrate comprehensive care into treatment plans

Incorporate a holistic care model into periodontal treatment that combines risk factor management with a mix of non-surgical and surgical interventions. Ensure a strong emphasis on Supportive Periodontal Care (SPC) to maintain oral health and prevent the recurrence of disease.¹⁴

Strengthen patient engagement in treatment

Boost patient involvement in their periodontal health by focusing on biofilm control and mitigating risk factors. Promote a partnership between patients and dental professionals to achieve and sustain periodontal health, using patient education and motivation strategies that are culturally appropriate and multidisciplinary.

Incorporate adjunctive therapies wisely

Encourage healthcare providers to judiciously integrate adjunctive therapies into periodontal care in accordance with the available evidence. Recommend the careful selection of adjunct treatments such as local antiseptics and antibiotics^{15,16} as supplements to mechanical plaque control and subgingival instrumentation when conventional methods are insufficient.

Tailor Supportive Periodontal Care (SPC) programs

Develop personalized SPC programs¹⁷ that consider the connection between oral and systemic health and focus on enhancing patient adherence.

Adjust these programs to meet the diverse cultural, socioeconomic, and literacy levels of the population, ensuring they are accessible and relevant to patients.

Update dental education and practice

Advocate for the modernization of dental education and practice across Latin America and the Caribbean to align with contemporary, evidence-based periodontal care approaches. Emphasize affordable and practical interventions that cater to the regional socioeconomic conditions, and foster continuous professional development for dental practitioners.

Advocate for comprehensive public health policies

Push for the development and enhancement of inclusive public health policies that address periodontal disease as part of the wider oral and general health agenda. These policies should focus on preventive care, timely intervention, and the integration of periodontal health services into the primary healthcare framework, enhancing access for marginalized communities.

Conclusion

In summary, the 2024 Consensus on Periodontology articulates a comprehensive strategic approach, designed to tackle the significant public health challenge posed by periodontal diseases in the region. It simultaneously tackles critical areas such as disease prevalence, effects on oral health-related quality of life, systemic health correlations, and risk factors simultaneously with diagnostic, preventive, and therapeutic measures based on clear, actionable strategies. Thus the consensus lays a solid foundation for significant improvements in periodontal health across the region. Moreover, it aims to mobilize clinical and policy decision-making processes, ensuring that these strategies are effectively implemented. Their successful execution depends on the persistent, concerted efforts of dental practitioners, researchers, educators, and policy makers, all working in unison towards the common goal of ensuring all individuals within the

region have equitable access to effective periodontal prevention, diagnosis, and treatment.

Acknowledgments

This manuscript was prepared for the consensus titled “Latin America and Caribbean Periodontics Consensus 2024” organized by the Latin American

Oral Health Association (LAOHA). The consensus process actively engaged experts from across the region, and the broader community was invited to review and contribute to the content. The resulting Consensus Report was derived from this paper. We would like to acknowledge the Colgate Palmolive Company for their support.

References

1. Carvajal P, Carrer FCA, Galante ML, Vernal R, Solis CB. Prevalence of periodontal diseases: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e116. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0116>
2. Romito GA, Collins JR, Hassan MA, Benítez C, Contreras A. Burden and impact of periodontal diseases on oral health-related quality of life and systemic diseases and conditions: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e117. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0117>
3. Pannuti CM, Alarcón MA, Ramírez Lemus GM, Yunes Fragoso P, Retamal-Valdes BS, Cornejo-Ovalle M et al. Risk factors of periodontal disease: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e118. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0118>
4. Rösing CK, Cavagni J, Langa GPJ, Bustillos Torrez W, Cepeda Bravo JA. Periodontal disease and its impact on general health in Latin America: diagnosis: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e119. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0119>
5. Duque Duque , Chaparro Padilla A, Almeida ML, Marín Jaramillo RA, Romanelli HJ, Laufarie Villamil GI. Strategies for the prevention of periodontal disease and its impact on general health: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e120. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0120>
6. Fischer RG, Amaral GCLS, Huamán-Mendoza AA, Bueno LR, Villar CC. Treatment of periodontal diseases: Latin America and the Caribbean Consensus 2024. *Braz Oral Res.* 2024;38(suppl):e121. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0121>
7. World Health Organization. Oral health surveys: basic methods. 5th ed. Geneva: World Health Organization; 2013.
8. Pattamatta M, Chapple I, Listl S. The value-for money of preventing and managing periodontitis: Opportunities and challenges. *Periodontol* 2000. 2024 May 14. <https://doi.org/10.1111/prd.12569>
9. Leite FRM, Nascimento GG, Scheutz F, López R. Effect of smoking on periodontitis: a systematic review and metaregression. *Am J Prev Med.* 2018 Jun;54(6):831-841. <https://doi.org/10.1016/j.amepre.2018.02.014>
10. Villoria GEM, Fischer RG, Tinoco EMB, Meyle J, Loos BG. Periodontal disease: a systemic condition. *Periodontol* 2000. 2024 Nov 4. <https://doi.org/10.1111/prd.12616>
11. Nascimento GG, Leite FRM, Vestergaard P, Scheutz F, López R. Does diabetes increase the risk of periodontitis? A systematic review and meta-regression analysis of longitudinal prospective studies. *Acta Diabetol.* 2018 Jul;55(7):653-667. <https://doi.org/10.1007/s00592-018-1120-4>.
12. Caton JG, Armitage G, Berglundh T, Chapple ILC, Jepsen S, Kornman KS, et al. A new classification scheme for periodontal and peri-implant diseases and conditions: introduction and key changes from the 1999 classification. *J Periodontol.* 2018 Jun;89 Suppl 1:S1-S8. <https://doi.org/10.1002/JPER.18-0157>
13. Glick M, Williams DM. FDI Vision 2030: delivering optimal Oral Health for All. *Int Dent J.* 2021 Feb;71(1):3-4. <https://doi.org/10.1016/j.identj.2020.12.026>.
14. Sanz M, Herrera D, Kerschull M, Chapple I, Jepsen S, Berglundh T, et al. Treatment of stage I-III periodontitis: the EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2020 Jul;47(Suppl 22):4-60. <https://doi.org/10.1111/jcpe.13290>
15. Costa LF, Amaral CD, Barbirato DD, Leão AT, Fogacci MF. Chlorhexidine mouthwash as an adjunct to mechanical therapy in chronic periodontitis: a meta-analysis. *J Am Dent Assoc.* 2017 May;148(5):308-18. <https://doi.org/10.1016/j.adaj.2017.01.021>
16. Teughels W, Feres M, Oud V, Martín C, Matesanz P, Herrera D. Adjunctive effect of systemic antimicrobials in periodontitis therapy: a systematic review and meta-analysis. *J Clin Periodontol.* 2020 Jul;47(S22 Suppl 22):257-81. <https://doi.org/10.1111/jcpe.13264>
17. Leow NM, Moreno F, Marletta D, Hussain SB, Buti J, Almond N, et al. Recurrence and progression of periodontitis and methods of management in long-term care: A systematic review and meta-analysis. *J Clin Periodontol.* 2022 Jun;49(S24 Suppl 24):291-313. <https://doi.org/10.1111/jcpe.13553>