

# Periodontal disease and its impact on general health in Latin America.

## Section II: Introduction part II

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**Abstract:** The epidemiological data on gingivitis and periodontitis in Latin America are scarce, as the majority of the Latin American studies have analyzed probing depth instead of clinical attachment loss. Reported data have shown high variations in results between different Latin American countries, with the main causes of these differences being the clinical case definition and methodological strategies used. In general, data have revealed that the prevalence of periodontal disease is higher in Latin Americans than in populations in the USA or Europe. Regarding its relations with other diseases and conditions, some Latin American studies have focused on the association between periodontitis and adverse pregnancy outcomes, or poor glycemic control in diabetic patients; however, these studies have reported controversial results. In Chile, reports have indicated that periodontal treatment significantly reduced the preterm birth rate; however, no association between periodontitis and perinatal outcome was found in Brazil. For diabetes mellitus, Brazilian studies have reported controversial findings; however, a Chilean interventional study reported significant reductions in the glycosylated hemoglobin levels after periodontal treatment. Although epidemiological data for Latin America are scarce, the information available at present is useful for establishing national policies on health promotion, prevention, and treatment of periodontal disease. Therefore, dental schools must play a key role in educating professionals who are highly trained in the promotion, prevention, early diagnosis and treatment of periodontal disease, with an approach to risk, and strong biopsychosocial and ethical components. Thus, future Latin American dentists would be able to face the challenge of decreasing the prevalence of periodontal diseases by leading interdisciplinary health teamwork.

**Keywords:** Periodontal Diseases; Gingivitis; Periodontitis; Epidemiology; Latin America.

## Introduction

Gingivitis is a prevalent type of periodontal disease in subjects of all ages, including children and adolescents. However, epidemiological data on gingivitis are scarce in Latin America, particularly with respect to nationwide representative studies.<sup>1</sup> Furthermore, when gingivitis is

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studied, there are some methodological difficulties, such as the lack of a uniform case definition of gingivitis, a cut-off point to determine its presence, diversity of periodontal indices used, and the use of partial records that could over- or under-estimate the prevalence of the disease.<sup>2</sup> The most frequently used indices are the Community Periodontal Index (CPI) and the Community Periodontal Index of Treatment Needs (CPITN), both corresponding to partial registers proposed by the World Health Organization (WHO).

For periodontitis, most data available for Latin America still rely directly or indirectly on periodontal probing depth estimates. The measurement of periodontal attachment loss allows for estimation of the cumulative periodontal breakdown, while periodontal probing depth ignores the periodontal destruction accompanied by gingival recession or the position of the gingival margin in relation to the size of the periodontal pocket. Therefore, the use of periodontal probing depth estimates leads to controversial information. Several case definitions of periodontitis have been proposed and used<sup>3,4</sup>; for example, during the World Workshop 2017, a single definition of periodontitis was suggested, outlined by either interdental clinical attachment loss (CAL) detectable at sites in two or more non-adjacent teeth or buccal or oral CAL  $\geq 3$ mm with periodontal pockets  $> 3$ mm in at least 2 teeth.<sup>5</sup> Nevertheless, there are no Latin American studies using this periodontitis case definition at the moment.

## Prevalence and risk indicators for gingivitis in Latin America

A recent literature review reported that inflammatory periodontal diseases were highly prevalent in Latin American children and adolescents. On an average, gingivitis affects 34.7% of young Latin American individuals, with the highest prevalence found in Colombia (77%) and Bolivia (73%), and the lowest prevalence in Mexico (23%). In other countries, the prevalence of gingivitis ranged from 31 to 56%.<sup>2</sup> Therefore, due to its high prevalence, gingivitis needs to be identified and treated in young individuals, particularly considering its implication as a risk

indicator for the development of periodontitis when these individuals become adults.<sup>6,7</sup>

The most common risk indicators for gingivitis in Latin America are poor oral hygiene and low socioeconomic status.<sup>2,8</sup> Furthermore, it has been clearly established that the prevalence of gingivitis increases with age.<sup>2,8</sup> In the Latin American adult population, three multicentric studies have been conducted with the purpose of estimating the prevalence and severity of gingival inflammation.<sup>9,10,11</sup> In Brazil, Argentina, and Chile, the prevalence of gingival inflammation reached 96.5%.<sup>9</sup> In Jamaica, the Dominican Republic, and Puerto Rico, all the subjects analyzed had gingival inflammation.<sup>11</sup> In these countries, the main risk indicators for gingival inflammation were higher indices of calculus, visible plaque  $\geq 30\%$ , and having  $\leq 12$  years of schooling.<sup>9,11</sup> In Mexico, Costa Rica, and Colombia, the prevalence of gingival inflammation reached 99.6% and the most important risk indicator was dental plaque accumulation.<sup>10</sup> Regarding the severity of gingival inflammation, these studies revealed that the majority of individuals examined had moderate gingival inflammation,<sup>9,10,11</sup> according to the gingival index of Löe and Silness.

## Prevalence and risk indicators for periodontitis in Latin America

Epidemiological studies in Latin America have not consistently used any uniform case definition of periodontitis. In addition, the possibility of making comparisons between the prevalence of periodontitis among the different countries has been hindered by the use of different methodological strategies for selecting representative sample, calculating the sample size, calibrating the examiners, selecting the teeth for analysis, selecting the periodontal sites for analysis, and recording the data obtained.<sup>12</sup>

In general terms, a high prevalence of periodontal destruction was reported in most of the Latin American studies, with high variability among the periodontal estimates. In Argentina, using the CPI, it was reported that 40.7% of adults  $\geq 18$ -years-old had at least one periodontal pocket  $\geq 3.5$  mm.<sup>13</sup> In Brazil, a national survey conducted in 2010, using the

CPI/CPITN indexes, reported that the prevalence of subjects from 35 to 44 years of age with periodontal probing depth  $\geq 4$  mm was 19.4%.<sup>12</sup> In Porto Alegre, Brazil, the prevalence of at least six teeth with CAL  $\geq 5$  mm was 62.6% and with CAL  $\geq 7$  mm was 37.3% in  $\geq 18$  year-old subjects, while the prevalence of periodontitis was 31.4%, defined as individuals with CAL  $\geq 5$  mm affecting  $\geq 30\%$  of teeth, and this increased with age. In addition, periodontitis was more prevalent among male subjects, individuals with low socioeconomic status, and heavy smokers.<sup>14</sup> The Chilean National Dental Examination Survey conducted in 2007 reported a high prevalence of CAL  $\geq 5$  mm, affecting 58.3% of subjects from 35 to 44 years of age, and 81.4% of subjects from 65 to 74 years old; the associated risk indicators were less than 12 years of schooling, being a man, smoking, and age.<sup>15</sup> The Colombian Oral Health Survey conducted in 2014 reported that 61.8% of the adult population presented periodontitis, using the case definition for surveillance of periodontitis proposed by the Center for Disease Control/ American Academy of Periodontology (CDC/AAP).<sup>4</sup> In addition, the prevalence of severe periodontitis was 7.8% in 35 to 44-year-old individuals, 20.3% in 45 to 64-year-old individuals, and 25.9% in 65 to 79-year-old individuals.<sup>16</sup> Thus, periodontitis was not homogeneously distributed in the Latin American population, and the risk indicators identified were the male gender, education/schooling, socio-economic status, smoking, obesity, and income.<sup>2</sup>

According to a recent multicenter study,<sup>17</sup> periodontal damage was prevalent in Latin American adolescents from 15 to 18 years of age. In fact, the prevalence of CAL  $\geq 3$  mm in at least 1 periodontal site was 32.6%, the probing pocket depth  $\geq 4$  mm was 59.3%, and bleeding on probing  $\geq 25\%$  was 28.6%. This prevalence was higher than that previously reported in Santiago, Chile (4.5%),<sup>18</sup> and Santo Domingo, Dominican Republic (4.8%)<sup>19</sup> – both studies using a partial-mouth recording – and Porto Alegre, Brazil (22.9%), with a full-mouth recording.<sup>20</sup> The risk indicators associated with CAL  $\geq 3$  mm, in at least 1 periodontal site for this age group, were smoking, attending a public school, and having bleeding on probing  $\geq 25\%$ .<sup>17</sup>

Overall, studies on the prevalence of destructive periodontal disease in urban and remote areas of Latin America have indicated high prevalence and low extent of moderate to severe periodontal attachment loss.<sup>12</sup> Although the data available are scarce and have diverse limitations, they clearly established that CAL was more prevalent in Latin Americans than it was in the USA or in the European populations.<sup>2</sup>

## Impact of periodontal disease on other diseases

Periodontitis has been associated with several systemic diseases and conditions, such as adverse pregnancy outcomes, cardiovascular diseases (CVD), respiratory diseases, diabetes mellitus (DM), chronic kidney disease, rheumatoid arthritis, dementia, metabolic syndrome, and cancer. The biological plausibility of these associations relies mainly on the low-grade systemic inflammatory burden characteristic of periodontitis.<sup>21</sup> In this context, a long-lasting but persistent periodontal infection has a huge impact on the healthcare economy,<sup>22</sup> because uncontrolled periodontal disease may contribute to the pathogenic events of these diseases, inducing changes in their progression and severity.<sup>21</sup>

The majority of the studies conducted in Latin America have focused on adverse pregnancy outcomes, CVD, and glycemic control during DM, and have shown controversial findings.<sup>12</sup> In Chile, reports have indicated that periodontal treatment significantly reduced preterm birth rate; however, contradictory results have been reported in studies conducted in Brazil.<sup>23,24,25</sup> In fact, a recent study reported no association between the clinical periodontal parameters analyzed and the perinatal outcome.<sup>26</sup> To understand the differences between the data obtained in Chile and Brazil, it is necessary to consider that the Chilean population is an ethnically and demographically more homogenous population than the Brazilian population, and that Chilean women receive a uniform and well-designed prenatal care program regulated by the Government. Perhaps a more important aspect to bear in mind is that Chilean women have been reported to have more severe periodontitis than women of the other Latin American countries.<sup>25</sup>

A meta-analysis of observational studies consistently supported an association between periodontal disease and CVD.<sup>27</sup> The epidemiological studies conducted in Latin America have, in general, supported this association; however, the results have shown high variability.<sup>12</sup> In this context, periodontal treatment has been shown to reduce short-term levels of systemic markers of inflammation directly related to the etiopathogenesis of CVD.<sup>28</sup>

A bidirectional relationship between periodontal disease and DM has been proposed (31). Indeed, periodontitis may impair glycemic control in DM patients<sup>29</sup> and periodontal treatment may improve glycemic control in these patients.<sup>30</sup> Interventional studies conducted in Brazil have obtained controversial findings, with some studies reporting significant reductions in the levels of glycosylated hemoglobin (HbA1c), whereas others found no significant changes in the HbA1c levels after periodontal treatment. These conflicting findings may be explained, at least partly, by the different therapeutic strategies used, small sample size, and criteria for selection of the subjects analyzed.<sup>12</sup> A recent study conducted in Chile reported that periodontal therapy led to a reduction in the level of HbA1c in DM patients with HbA1c > 9%, irrespective of the type of periodontal treatment.<sup>31</sup>

## Latin America strategies to increase the awareness of periodontal diseases

Currently, various cultural and socio-economic barriers to professional care prevent the population from applying correct preventive approaches, receiving early diagnosis and seeking timely treatment, resulting in limited progress in improving periodontal health.<sup>32</sup> Periodontal disease is socially determined. In order to effectively combat this disease, efforts and equity public policies that reduce social inequalities are required. Prevention should be the main measure of oral health actions, policies and programs for maintaining oral health and avoiding periodontal disease, through the effective management of gingivitis and promotion of healthy lifestyles at both population and individual levels.<sup>33</sup> This can

be accomplished by dental and health professionals providing patients with instructions on effective self-performed oral hygiene, such as how to properly brush the teeth and clean interdental spaces; in addition to an integrated and population-based approach to health education, focused on the common risk factor. Moreover, the concept should be emphasized that each individual needs to play a proactive role in the awareness of oral health, self-care measures, health promotion, and disease prevention, for optimal oral and general health throughout the course of life.<sup>34</sup> Furthermore, increasing awareness of the population about the importance of recognizing the early signs of periodontal diseases is advocated, by instructing people to understand the role of gingival inflammation, presence of bleeding gums, and self-examination of gingival tissues, in helping to prevent these diseases. To achieve these objectives, social networks could be a useful tool that should be explored, given that they provide quick, friendly, and massive means of disseminating information, which could favor the implementation and massification of strategies with the aim of educating our patients in periodontal health. For instance, a self-report questionnaire, designed for population-based surveillance of gingivitis in adolescents could be implemented.<sup>35</sup> In addition, these platforms could enhance public and professional awareness of periodontal health.<sup>36</sup>

The long-term sustainable strategy for global oral health must focus on health promotion and disease prevention, through controlling their common and modifiable risk factors based on the integrated link of oral health and general well-being. Thus, common oral diseases such as periodontal disease should be subject to effective prevention, control, care, and management by all healthcare professionals through a collaborative approach to achieving overall health.<sup>37,38</sup> Nevertheless, despite the need for more Latin American studies, the information available at present is very useful for establishing national policies on health promotion, prevention, and treatment of oral health, focused on comprehensive care. In almost all cases, destructive periodontal disease can be reduced or avoided if prevention and treatment of severe gingivitis begin early in life. The possibility of untreated periodontal disease being

capable of negatively affecting people's general health puts extra pressure on improving the periodontal health of young people in Latin America.

## Concluding remarks

Although periodontal disease represents one of the most common public health issues, regrettably, it has frequently been neglected in public health strategies and policies. This has led to significant socioeconomic impact in terms of healthcare costs, absence from school or work, and on the daily lives and self-esteem of individuals.<sup>39</sup> Periodontal diseases and non-communicable diseases share risk factors, such as consumption of tobacco. Thus, it is crucial to incorporate oral health into the general health agenda, with the purpose of achieving optimal health and general well-being.<sup>34</sup> In this context, dental schools should play a key role in training professionals with a focus on promotion, prevention, and early diagnosis of oral diseases, including periodontal diseases with an approach to risk, and strong biopsychosocial and ethical components. Thus, future Latin American dentists would be able to face the challenge of decreasing the prevalence of periodontal diseases by leading interdisciplinary health teamwork. Along this line, general dentists

should be professionally prepared to treat most periodontal patients in the mild and moderate stages of periodontitis (I and II stages, according to the 2018 classification for periodontal diseases and conditions),<sup>5</sup> and also be able to identify the subjects that should be referred to periodontal specialists.<sup>40</sup> The uses of goal setting, self-monitoring, and planning are effective interventions for improving oral hygiene in patients with periodontal disease. Therefore, we need future dentists who understand the seriousness of periodontal diseases and the benefits of changes in behavior by periodontal patients in the context of the comprehensive care of individuals.<sup>41</sup>

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