

## The Prevalence of Inflammatory Periodontal Diseases (Gingivitis, Periodontitis) among the Population

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### Abstract

Periodontitis and gingivitis are complex infectious diseases, which led to damage of the tooth supporting apparatus. In general, various periodontal diseases represent a vast problem in modern dentistry with a prevalence of 20-80% in the world population. Knowledge of the inflammatory periodontal disease's frequency with violation of the integrity of the dentition directly helps the practicing dentist to decide on the diagnostic tactics of patients and helps to develop skills for the prevention of periodontitis and patient motivation. The purpose of this article is to determine the prevalence of periodontitis in the population according to the data of modern literature sources.

The study of publications was produced in the electronic databases such as Google Scholar, PubMed during a systematic review of the literature. Included articles contain information about prevalence of inflammatory periodontal diseases, relationship between general health conditions and periodontitis. The publication date criterion was selected from 2017 to 2023.

178 articles were viewed during the review. After analyzing the literature for inclusion criteria, the total number of publications has become 50.

Based on the analyzed data, it can be concluded that inflammatory periodontal diseases are a fairly common pathology.

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### Introduction

Periodontitis and gingivitis are complex infectious diseases that led to damage of the tooth supporting apparatus including soft and hard tissues. In the context of current realities, gingivitis and periodontitis, periodontal diseases in general, represent a vast problem in modern dentistry with a prevalence of 20-80% in the world population, of which 11.2% are severe cases.<sup>1-3</sup>

Gingivitis often first appears in the younger and adolescent years due to insufficient quality individual oral hygiene and hormonal

restructuring of the body. Periodontitis tends to have its primary manifestation and further progression in adulthood, but it is not impossible for this disease to occur in childhood or adolescence, which is especially relevant in the discussion of aggressive forms of periodontitis, juvenile periodontitis.<sup>4,5</sup>

Although periodontal problems are a multifactorial disease with various local and general factors involved in its pathogenesis, the main cause of its occurrence is thought to be bacterial biofilm formation. The oral cavity is contaminated with a variety of commensal microorganisms, many of which are periodontopathogens, which have a beneficial effect under normal conditions by preventing the growth and colonization of potentially damaging microorganisms. However, an increase in the number of periodontopathogens, particularly *Porphyromonas gingivalis*, increases the risk of periodontal disease initiation through the formation of an aggressive biofilm. Good oral hygiene, regular prophylaxis and patient

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motivation help to reduce the risk of infectious periodontal disease. Periodontal disease, however, if the level of hygiene is inadequate, the biofilm tends to mineralize and deposit as tartar (supra- and sub-gingival).<sup>6-9</sup>

Knowledge of the inflammatory periodontal diseases' frequency with violation of the integrity of the dentition directly helps the practicing dentist to decide on the diagnostic tactics of patients, and also helps to develop skills for the prevention of periodontitis and patient motivation.

The purpose of this article is to determine the prevalence of periodontitis in the population according to the data of modern literature sources.

### Materials and methods

#### • Information Sources

Up-to-date information in English from Google Scholar, PubMed electronic databases has been studied.

#### • Literature search strategy

Search terms and queries included the following: "prevalence of periodontitis", "frequency of periodontitis", "periodontitis AND multispecies biofilms", "periodontal disease prevalence", "epidemiology AND periodontitis", "inflammatory periodontal diseases prevalence", "gingivitis prevalence", "epidemiology AND gingivitis".

#### • Eligibility Criteria

The analysis included works that met the following selection criteria:

- (1) Articles for the period from 2017 to 2023;
- (2) An article describes the prevalence of inflammatory periodontal diseases;
- (3) An article describes the relationship between general health conditions and periodontitis;
- (4) The research describes the relationship between general health conditions and gingivitis;
- (5) The article describes the level periodontal status in adolescents and adult population.

The publications were selected and included in the analysis in several stages. In the first stage, repeated publications and works dated 2017 and earlier were excluded. Then, the title and brief content of the articles were analyzed for the presence of the key selection criteria, which were described above. After that, the content and full-text versions of the selected articles were considered (Figure 1).

#### • Risk of Bias Assessment

Cochrane Collaboration data were used to assess the risk of bias, with tests performed at each of the selection stages. The levels of bias were classified as follows: low risk, if all the criteria were met; moderate risk, when only one criterion was missing; high risk, if two or more criteria were missing; and unclear risk, if there were very few details to make a judgement about a certain risk assessment.

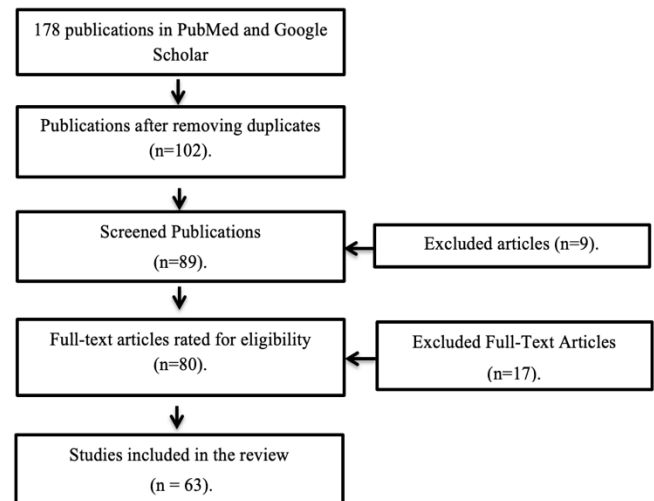


Figure 1. Article selection process.

178 articles were reviewed, of which 28 were from the PubMed database, 150 were from Google Scholar. After the selection according to the inclusion criteria, the total number of articles was 50. In the selected articles, the relevant data on the prevalence of inflammatory periodontal diseases, relationship between general health conditions and gingivitis, periodontitis, the level periodontal status in adolescents and adult population are described.

### Discussion

Currently, epidemiological studies of the inflammatory periodontal disease prevalence demonstrate high rates of morbidity. Scientific publications from all over the world show that the percentage of patients with periodontal disease is increasing.

According to research data, the primary manifestations of inflammatory periodontal diseases in the form of gingivitis are observed in patients of different age groups.

Folayan M.O. et al. studied a group of 839 children aged 6 to 11 years. The results of the

study showed a prevalence of gingivitis with a rate of 63.3%.<sup>1</sup> According to the several authors, the prevalence of gingivitis in children aged from 6 to 12 years is 28.58%, including 701 cases of localized gingivitis (24.3%) and 122 cases of generalized gingivitis (4.2%).<sup>2,3</sup> Murtazaev S. examined 60 children aged from 6 to 16 years for the state of periodontal tissues. The clinical condition was assessed using the classical periodontal index PMA and hygiene indices. The high prevalence of gingivitis among schoolchildren, reaching 68%, was established after statistical analysis.<sup>4</sup>

Zhang Z. et al. studied the periodontal status of adolescents. They examined 3,871 students aged from 12 to 15 years. On the basis of the results, the prevalence of gingivitis was 85.6%.<sup>5</sup> Dalimova Sh. conducted a survey of 35 students. The average age was 21 years old. All participants were assessed the level of hygiene and the status of periodontal tissues. After statistical analysis it was established that the prevalence of gingivitis among students reached 88.89%. In 68.57% of the examinees, gingivitis was presented with strongly expressed clinical signs of bleeding.<sup>6</sup> The main results of the ElShanti, A. F. H. & coauthors survey of 408 students 15-19 years old in the study showed that the prevalence of gingivitis among high school students was 97.1%.<sup>7</sup> In a clinical study AL-Bahadli evaluation of periodontal tissues in 2280 patients from 16 to 65 years old revealed the presence of gingivitis in 63.46%.<sup>8</sup>

According to Lu H.X., the prevalence of gingivitis signs in the adult population is 67.3%.<sup>9</sup> Janakiram C. et al. conducted a large-scale systematic review including a total of 92219 adult patients. The average prevalence of gingivitis from the analysis was 46.6%.<sup>10</sup> Only 37.5% of patients aged 45-54 years had clinically healthy periodontal tissues, according to the results obtained by Rajasekar A. et al. The prevalence of gingivitis in patients aged between 65-74 years was 31%.<sup>11</sup> Malaka M. et al. conducted a clinical examination of 1,650 adult patients and found that 50% and 36% of the participants involved in the study had gingivitis and periodontitis, respectively.<sup>12</sup>

Several studies have focused on periodontal health in athletes. A total of 1,240 athletes aged 18-39 years underwent an index assessment of oral hygiene and periodontal tissue condition. The results of the study showed

a high prevalence of gingivitis between 58-97%.<sup>13-15</sup>

Pregnant women are a special group of patients with a predisposition to develop gingivitis. Studies of the gingivitis prevalence among pregnant women are routinely conducted to assess the quality of counseling and screening. Erchick D.J. et al. examined 1,452 pregnant women. The result of the study showed that 40% of the women (n = 582) had clinical symptoms of gingivitis.<sup>16</sup> Kaura M. A. et al. identified gingivitis in 82.3% of pregnant women.<sup>17</sup> Rezvi F. B. et al. reported gingivitis in 40.3% of pregnant women, and Tedjosongko U. et al. reported it in 73%.<sup>18,19</sup>

The obtained data indicate a high prevalence of gingivitis in the population at the current moment. A higher prevalence of gingivitis in children, adolescents, and a gradual and decrease in the prevalence of gingivitis in the elderly adult population is also noted, which is associated with the progression of gingivitis to periodontitis if it is untreated.

Studies of periodontitis prevalence are conducted worldwide and also show a high prevalence of the disease. For example, Eke P. I. et al. studied the prevalence of periodontitis in adults aged from 30 to 79 years. The results showed that periodontitis affects 42.2% of the population, with 7.8% of people suffering from severe periodontitis.<sup>20</sup> Holde G. E. et al. studied the prevalence of periodontitis among patients aged from 20 to 79 years. According to the results of the study, 49.5% of participants had periodontitis, and 9.1% had severe periodontitis. The prevalence and severity of periodontitis increased with age.<sup>21</sup> Atayeva M. A. and coauthors report that 10-15% of children aged from 13 to 16 years have generalized forms of gingivitis and periodontitis.<sup>22</sup>

Nazir M.A. et al. found that periodontal disease is common in both developed and developing countries and affects about 20-50% of the world's population.<sup>23</sup> In another study, the authors concluded that the prevalence of periodontal disease increases with age. Periodontitis is most prevalent especially among the elderly and among the population of high-income countries.<sup>24</sup> Balaji S. K. et al. surveyed 1,000 patients younger than 18 years. The prevalence of chronic generalized periodontitis in the urban population was 13%.<sup>25</sup> According to Germen M. et al. periodontitis in the adult

population occurs in 61.9% of patients, and the severe form of periodontitis - in 16.8%.<sup>26</sup> Helmi M. F. et al. conducted a study to detect the signs of periodontitis among 1131 patients. The overall prevalence of periodontitis was 55.5%. The prevalence of moderate periodontitis was 20.7%, while 2.8% of all patients had severe periodontitis.<sup>27</sup>

Stodle I. H. et al. conducted a large-scale examination of 7,347 patients over 19 years old. In 72.4% of them the authors found clinical signs consistent with periodontitis. The findings of the study indicate an increased rate of periodontitis in patients after the age of 40, as well as the severe forms being reported mostly after the age of 60.<sup>28</sup> According to O'Dwyer M. C. et al., periodontitis occurs in 65.8% of the adult population, Andayasari L. et al. - in 74.1%, Evnevich K.A. - in 64.5%, Antunes A. et al. - in from 41.2% to 69.0%.<sup>29-32</sup> Several studies have concluded that more than 50% of the adult population suffers from periodontitis.<sup>33-36</sup>

Relvas M. et al. examined periodontal health in 941 patients. According to the results, 457 patients (48.6%) had periodontitis and 253 participants (26.9%) had gingivitis. The frequency of occurrence was higher in men and in the age group of 61-70 years.<sup>37</sup>

Jiao J. et al. analyzed periodontal examination data in 3 groups of patients: 4409 patients aged from 35 to 44 years, 4622 patients aged from 55 to 64 years, and 4428 patients aged from 65 to 74 years. The incidence of periodontitis was 52.8%, 69.3%, and 64.6% in the three age groups, respectively. The frequency of patients with severe periodontitis was 10.6%, 37.3%, and 43.5% in the three age groups.<sup>38</sup>

Chevychelova O. N. et al. conducted a survey of 100 elderly patients. The prevalence of periodontal disease among the elderly population was assessed with regard to age, sex, geographic location of residence, and lifestyle habits. Periodontal indices were used to assess periodontal status. The overall prevalence of periodontal tissue disease was 81%. The highest prevalence of severe periodontitis was noted in patients over 65 years and older. The authors also noted a lower prevalence of inflammatory periodontal disease in the rural population compared to the urban population. The prevalence rates of the periodontal inflammatory pathologies in male population were lower than in

female.<sup>39</sup>

It is well known that gingivitis and periodontitis can not only be independent diseases, but also represent a manifestation of various changes in the general medical status of the patient.

Angst P.D.M. and others have shown that oral manifestations such as bleeding gums, inflammation or excessive gum growth, and periodontitis may be the first symptoms of leukemia.<sup>40,41</sup> The relationship between inflammatory periodontal tissue disease and various intestinal diseases has been noted by many authors. The study by Baima G. et al. showed that the prevalence of periodontitis and severe periodontitis was significantly higher in patients with inflammatory intestinal diseases compared to healthy patients of the similar age.<sup>42,43</sup> The prevalence of periodontitis was higher in patients with inflammatory bowel disease compared to controls (85.6% vs. 65.6%).<sup>42</sup> Several authors have noted a high prevalence of periodontitis in patients with ulcerative colitis and Crohn's disease.<sup>43-45</sup>

Shree S. et al. report a relationship between chronic obstructive pulmonary disease and periodontal disorders. Patients with lung disease had a low level of oral hygiene and a higher prevalence of periodontal disease. The incidence of periodontal inflammation was higher in the group of patients with chronic obstructive pulmonary disease (50.3%) compared to the control group (41.9%).<sup>46</sup>

Diabetes mellitus is also one of the diseases in which periodontal tissue changes can be observed. Todescan S. M. C. et al. examined 121 patients aged between 8-17 years. According to the results, 45.5% of participants had signs of marginal periodontitis. The authors concluded that uncontrolled HbA1c affects the prevalence of periodontal pathologies.<sup>47</sup>

The relationship between periodontal disease and cardiovascular disorders is also evident. In a study performed by Gor I. et al. it was found that 172 (95.6%) patients with coronary heart disease had periodontal problems with the prevalence of marginal generalized periodontitis in 84.3% of cases.<sup>48</sup> Other studies also demonstrate a high prevalence of periodontal disease in patients with heart and vascular disease, diabetes.<sup>49,50</sup>



## Conclusions

Based on the analyzed data, it can be concluded that inflammatory periodontal diseases are a fairly common pathology. Gingivitis and periodontitis can manifest in both children and adults and old patients with varying severity of symptoms and changes in the supporting apparatus of the tooth.

## Declaration of Interest

The authors report no conflict of interest.

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