

INFLAMMATORY AND MICROBIOLOGICAL FEATURES OF CHRONIC GINGIVITIS IN YOUNG ADULTS

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Abstract: *Chronic gingivitis is one of the most common inflammatory diseases of the oral cavity and remains a major public health problem worldwide. The disease is associated with microbial biofilm accumulation, local inflammatory response, and progressive periodontal tissue damage. The aim of this study was to evaluate the inflammatory and microbiological characteristics of chronic gingivitis in young adults and determine the clinical significance of oral hygiene indicators. The study included 46 patients with clinically confirmed chronic gingivitis. Clinical, microbiological, and laboratory evaluations were performed. Elevated plaque index, gingival bleeding index, and increased prevalence of pathogenic oral microorganisms were significantly associated with disease severity. Statistical analysis demonstrated a strong positive correlation between plaque accumulation and gingival inflammation ($r = 0.74$; $p < 0.001$). The findings confirm the important role of microbial imbalance and inflammatory activity in chronic gingivitis progression.*

Keywords: *chronic gingivitis, oral inflammation, periodontal disease, microbiology, plaque index, oral hygiene*

INTRODUCTION

Diseases of the oral cavity represent one of the most widespread chronic health problems globally. Among them, chronic gingivitis occupies a leading position due to its high prevalence and significant impact on oral health. According to international epidemiological studies, inflammatory periodontal diseases affect approximately 60–90% of the adult population worldwide [1]. Chronic gingivitis is characterized by inflammation of the gingival tissues caused primarily by bacterial plaque accumulation. Inadequate oral hygiene, smoking, metabolic disorders, nutritional deficiencies, and immune dysfunction contribute significantly to disease progression. Persistent inflammatory activity leads to gingival edema, bleeding, pain, and increased susceptibility to periodontal destruction. The oral cavity contains a highly complex microbiological ecosystem. Under pathological conditions, the balance between commensal and pathogenic microorganisms becomes disrupted, resulting in increased colonization by anaerobic bacteria such as *Porphyromonas gingivalis* and *Prevotella*

intermedia [2]. These microorganisms produce toxins and inflammatory mediators that accelerate tissue damage.

Early identification of inflammatory and microbiological changes is essential for preventing progression toward periodontitis and tooth loss. Therefore, studying the relationship between oral hygiene status, microbial activity, and inflammatory markers remains highly important in modern dentistry.

Materials and Methods

This study was conducted at a dental clinical center and included 46 patients diagnosed with chronic gingivitis. The mean age of participants was 24.6 ± 3.8 years. Men accounted for 25 patients (54.3%), while women represented 21 patients (45.7%). Clinical examination included assessment of plaque index (PI), gingival bleeding index (GBI), and periodontal inflammation severity. Microbiological analysis of oral cavity samples was performed to identify pathogenic bacterial flora. Laboratory evaluation included inflammatory markers and salivary pH analysis.

Patients with systemic inflammatory diseases, diabetes mellitus, and recent antibiotic therapy were excluded from the study. Statistical analysis was conducted using variation statistics and Pearson correlation analysis. Quantitative variables were expressed as mean \pm standard deviation ($M \pm SD$). Statistical significance was accepted at $p < 0.05$.

Results

The study demonstrated significant inflammatory and microbiological alterations in patients with chronic gingivitis. The mean plaque index was 2.4 ± 0.5 , while gingival bleeding index reached $48.6 \pm 9.2\%$. Moderate gingival edema and hyperemia were observed in 67.4% of patients. Microbiological analysis revealed increased prevalence of anaerobic pathogenic bacteria. *Porphyromonas gingivalis* was identified in 58.7% of cases, while *Prevotella intermedia* was detected in 43.5%. Elevated bacterial colonization was significantly associated with higher gingival bleeding scores. Correlation analysis demonstrated a strong positive relationship between plaque index and gingival inflammation severity ($r = 0.74$; $p < 0.001$). Salivary pH values were reduced to 6.2 ± 0.4 in patients with severe inflammation, indicating increased acidic activity in the oral environment.

Smoking was identified in 36.9% of patients and was associated with significantly worse periodontal indicators. In smokers, gingival bleeding and plaque accumulation were approximately 28% higher compared to non-smokers. Men demonstrated slightly higher plaque index values than women, whereas women showed greater gingival sensitivity and bleeding tendency. Patients with poor oral hygiene habits exhibited recurrent inflammatory episodes approximately 1.9 times more frequently. Additionally, halitosis was reported in 52.2% of participants and correlated with increased bacterial colonization ($r = 0.58$; $p < 0.01$).

Discussion

The findings of this study confirm the major role of microbial biofilm accumulation in the development and progression of chronic gingivitis. Increased plaque index values directly contributed to gingival inflammation and bleeding severity. Similar findings have been reported in previous periodontal studies [3]. The predominance of anaerobic pathogenic microorganisms demonstrates the importance of microbiological imbalance in periodontal tissue damage. These bacteria stimulate inflammatory cytokine release and oxidative stress, leading to progressive gingival destruction.

Smoking significantly aggravated inflammatory changes and microbial colonization. Tobacco exposure negatively affects local immunity, vascular microcirculation, and salivary protective mechanisms, thereby accelerating periodontal inflammation. The observed decrease in salivary pH indicates metabolic changes within the oral cavity that favor bacterial growth and biofilm formation. These findings emphasize the importance of preventive oral hygiene measures and early periodontal intervention.

Conclusion

Chronic gingivitis is associated with significant inflammatory and microbiological disturbances that contribute to progressive periodontal tissue damage. Elevated plaque accumulation, pathogenic bacterial colonization, and impaired oral hygiene were identified as major risk factors for disease severity.

The findings demonstrate that early diagnosis, microbiological monitoring, and preventive oral hygiene strategies are essential for reducing inflammatory complications and preventing progression toward advanced periodontal disease.

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