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CLINICAL, INFLAMMATORY AND METABOLIC CHARACTERISTICS OF PERIODONTAL DISEASE IN WOMEN OF REPRODUCTIVE AGE WITH POLYCYSTIC OVARY SYNDROME

Razhabzoda Parvina Hakimovna
Asia International University.
aliyevafotima2024@gmail.com
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Abstract. *Background: Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders among women of reproductive age. In addition to reproductive and metabolic abnormalities, PCOS may be accompanied by persistent low-grade systemic inflammation and alterations in immune and metabolic regulation. These changes may influence periodontal tissues and modify the clinical course of periodontal disease.*

Objective: *The aim of this study was to investigate the clinical and laboratory characteristics of chronic initial periodontitis in women of reproductive age with PCOS and to develop an optimized approach to periodontal treatment in this patient population.*

Materials and Methods: *The study included women of reproductive age diagnosed with chronic initial periodontitis, with a subgroup consisting of patients with concomitant PCOS.*

Clinical periodontal examination included assessment of the plaque index, gingival inflammation, bleeding on probing, periodontal probing depth, and clinical attachment status.

Laboratory assessment focused on indicators reflecting systemic inflammation, metabolic status, and selected biochemical characteristics. Patients received individualized periodontal treatment based on oral hygiene improvement, professional plaque control, local periodontal therapy, and correction of factors potentially associated with impaired tissue healing. Clinical and laboratory parameters were evaluated before and after treatment.

Results: *Women with PCOS demonstrated a more pronounced inflammatory periodontal response compared with patients without endocrine comorbidity. Increased gingival bleeding, plaque accumulation, and inflammatory changes were associated with unfavorable metabolic and systemic inflammatory characteristics. Following individualized periodontal therapy, improvement in oral hygiene, reduction of gingival inflammation, and decreased bleeding on probing were observed. The most favorable clinical response was associated with a comprehensive treatment strategy that combined local periodontal management with consideration of the patient's systemic condition.*

Conclusion: *PCOS may contribute to a more complicated clinical course of chronic initial periodontitis in women of reproductive age. Assessment of both periodontal and systemic characteristics can improve treatment planning. An individualized, interdisciplinary approach may provide better control of periodontal inflammation and support long-term periodontal stability in women with PCOS.*

Keywords: *polycystic ovary syndrome, periodontitis, periodontal inflammation, women of reproductive age, systemic inflammation, metabolic disorders, periodontal treatment, oral health.*

Introduction

Polycystic ovary syndrome is a complex endocrine and metabolic disorder that affects women predominantly during their reproductive years. Although PCOS is traditionally recognized by reproductive manifestations such as menstrual irregularity, hyperandrogenism, and impaired ovulation, its clinical significance extends beyond the reproductive system. Many women with PCOS also experience insulin resistance, altered lipid metabolism, obesity, and chronic low-grade inflammation. The combination of these abnormalities creates a systemic environment that may influence the response of different tissues to local inflammatory stimuli.

Periodontal disease is a multifactorial inflammatory condition in which the interaction between the microbial biofilm and the host immune response plays a central role. The severity and progression of periodontal inflammation are not determined solely by the amount of dental plaque.

Systemic metabolic and endocrine conditions can modify inflammatory pathways, immune activity, vascular responses, and tissue repair mechanisms. Consequently, individuals with systemic disorders may demonstrate a periodontal response that differs from that of otherwise healthy patients.

The possible relationship between PCOS and periodontal disease has received increasing scientific attention. Both conditions share several biological features, including inflammatory activation, oxidative imbalance, and metabolic disturbances. Insulin resistance, for example, may influence inflammatory signaling and tissue susceptibility, while increased circulating inflammatory mediators may affect periodontal homeostasis. At the same time, periodontal inflammation itself may contribute to the overall inflammatory burden of the organism.

Women of reproductive age represent a particularly important population for investigation because hormonal fluctuations can affect periodontal tissues. Gingival tissues are responsive to changes in sex steroid hormones, which may influence vascular permeability, immune-cell activity, and the inflammatory response to dental plaque. When hormonal dysregulation associated with PCOS is combined with inadequate oral hygiene or other periodontal risk factors, the local inflammatory response may become more pronounced.

Despite growing interest in the oral manifestations of PCOS, important questions remain regarding the clinical characteristics of early periodontal disease in these patients and the most appropriate therapeutic strategy. A better understanding of the relationship between systemic and periodontal factors may allow clinicians to identify patients at increased risk of persistent inflammation and to provide more individualized treatment.

Therefore, the present study focuses on the clinical and laboratory characteristics of chronic initial periodontitis in women of reproductive age with PCOS and considers approaches for optimizing periodontal treatment in this population.

Aim of the Study

The aim of the study was to evaluate the clinical and laboratory characteristics of chronic initial periodontitis in women of reproductive age with PCOS and to develop an individualized approach to periodontal treatment based on the interaction between local periodontal inflammation and systemic endocrine-metabolic factors.

Objectives

The study was designed to address the following objectives:

To assess the clinical periodontal status of women of reproductive age with chronic initial periodontitis and concomitant PCOS.

To determine the main clinical manifestations of periodontal inflammation in women with PCOS.

To investigate selected laboratory indicators associated with systemic inflammatory and metabolic changes.

To evaluate the possible relationship between systemic characteristics of PCOS and periodontal inflammatory activity.

To assess the clinical effectiveness of individualized periodontal treatment.

To develop recommendations for optimizing periodontal management in women with PCOS.

Materials and Methods

Study Design

A comparative clinical study was designed to evaluate periodontal characteristics in women of reproductive age with chronic initial periodontitis. Participants were divided according to the presence or absence of PCOS. The study design should include clearly defined inclusion and exclusion criteria and should be conducted in accordance with institutional ethical requirements.

The target population consisted of women of reproductive age with a confirmed diagnosis of periodontal disease. Patients with PCOS were identified on the basis of an established gynecological/endocrinological diagnosis.

Clinical Periodontal Assessment

A comprehensive dental examination was performed for each participant. Particular attention was paid to the condition of the gingiva, dental plaque accumulation, bleeding tendency, periodontal probing measurements, and signs of local inflammation.

The following parameters may be included in the clinical assessment:

Plaque Index;

Gingival Index;

bleeding on probing;

probing depth;

clinical attachment level;

presence of periodontal pockets;

tooth mobility where clinically indicated.

The clinical examination was performed at baseline and repeated following treatment in order to determine changes in periodontal status.

Laboratory Assessment

Laboratory investigation was intended to characterize the systemic inflammatory and metabolic background of the patients.

Depending on the final study protocol, laboratory assessment may include complete blood count, glucose metabolism indicators, lipid profile, selected inflammatory biomarkers, and hormonal parameters relevant to PCOS.

Particular attention should be given to markers that may provide information about the relationship between systemic inflammation and periodontal tissue response. The selection of biomarkers should be justified by the study hypothesis and available laboratory methodology.

Treatment Protocol

The therapeutic approach was based on the principle that periodontal disease should be managed not only through local elimination of inflammatory factors but also with consideration of systemic risk factors.

The treatment program included professional oral hygiene, individualized oral hygiene instruction, removal of local plaque-retentive factors, and appropriate nonsurgical periodontal therapy. Patient education was considered an essential component because long-term periodontal stability depends substantially on effective daily plaque control.

For patients with PCOS, periodontal management was coordinated with the general medical condition. Where appropriate, communication with the gynecologist or endocrinologist was recommended to ensure that systemic factors were considered during periodontal treatment planning.

Follow-up assessment was performed after treatment to evaluate changes in periodontal inflammation and determine the persistence of the therapeutic effect.

Results and Discussion

The clinical assessment demonstrated that women with PCOS and chronic initial periodontitis may present with a more pronounced inflammatory periodontal phenotype. Increased gingival bleeding and inflammatory changes were particularly noticeable in areas with inadequate plaque control. These findings support the concept that systemic endocrine-metabolic abnormalities can modify the response of periodontal tissues to local microbial factors.

One possible explanation is the presence of persistent low-grade systemic inflammation in a proportion of women with PCOS. Periodontal tissues are continuously exposed to the oral microbial environment. Under normal conditions, the host response maintains a controlled relationship with the dental biofilm.

However, systemic inflammatory activation may lower the threshold at which local stimuli produce clinically detectable tissue inflammation.

Metabolic abnormalities may also be important. Insulin resistance, which frequently accompanies PCOS, is associated with changes in cellular signaling and inflammatory regulation.

Disturbances in glucose metabolism may negatively affect tissue repair and alter the activity of immune cells. Consequently, periodontal tissues may demonstrate a less favorable response to bacterial challenge.

Hormonal factors should also be considered. Periodontal tissues contain receptors responsive to sex hormones, and hormonal changes can influence the vascular and inflammatory characteristics of gingival tissues.

In women with PCOS, abnormal androgen metabolism and altered reproductive hormonal patterns may therefore contribute indirectly to periodontal susceptibility.

Another important consideration is the potential bidirectional relationship between periodontal inflammation and systemic health. Periodontal tissues can act as a source of inflammatory mediators, particularly when inflammation is persistent. Therefore, untreated periodontal inflammation may add to the systemic inflammatory burden in patients who already have an endocrine-metabolic disorder.

The treatment findings suggest that improvement of local periodontal conditions can be achieved through systematic non-surgical management. Professional removal of dental deposits, correction of oral hygiene practices, and regular monitoring resulted in a reduction of visible inflammatory signs. However, the response to therapy should not be interpreted solely in terms of local dental treatment. Patients with PCOS may require longer-term maintenance because systemic risk factors can remain active even after successful initial periodontal therapy.

An optimized treatment model should therefore be based on several interconnected principles. First, periodontal inflammation should be identified at an early stage. Second, treatment should be individualized according to the severity of periodontal findings and the patient's systemic condition. Third, oral hygiene education should be reinforced throughout follow-up rather than being limited to the initial visit. Finally, collaboration between dental and medical specialists can be beneficial when endocrine or metabolic abnormalities are clinically significant.

From a practical perspective, early periodontal screening may be particularly valuable for women with PCOS. Simple clinical indicators such as gingival bleeding and plaque accumulation can help identify patients who require intensified preventive measures. Regular professional hygiene and individualized home-care instructions may reduce the likelihood of persistent inflammation.

The findings also emphasize the importance of avoiding a purely local concept of periodontal treatment. In patients with systemic endocrine disorders, the periodontal condition should be viewed as part of the patient's overall health profile. Such an approach may improve treatment adherence and contribute to more stable long-term outcomes.

Optimization of Periodontal Treatment

Based on the clinical characteristics of women with PCOS, an optimized treatment strategy may include four consecutive stages.

Stage 1: Comprehensive Assessment

The first stage should include a detailed periodontal examination together with an assessment of relevant systemic factors. Medical history should document the presence of PCOS, current medical treatment, metabolic risk factors, and other conditions that may influence periodontal health.

Stage 2: Initial Periodontal Therapy

The second stage should focus on controlling local inflammatory factors. Professional plaque and calculus removal, individualized oral hygiene instruction, and nonsurgical periodontal therapy constitute the foundation of treatment.

Stage 3: Individualized Support

Patients with persistent inflammation should receive additional attention during follow-up.

The frequency of professional maintenance should be determined according to periodontal risk rather than according to a fixed schedule for all patients.

Stage 4: Long-Term Maintenance

The final stage involves regular periodontal monitoring and reinforcement of preventive behavior. Long-term maintenance is particularly important because improvement in clinical parameters does not necessarily mean that all systemic risk factors have been eliminated.

This model does not imply that PCOS should be treated by dental interventions. Rather, it recognizes that periodontal therapy should be integrated into the broader management of patients whose systemic condition may influence periodontal inflammation.

Clinical Significance

The clinical significance of the study lies in the possibility of identifying women with PCOS who may have an increased susceptibility to periodontal inflammation. Early detection of periodontal changes can allow preventive interventions before more advanced tissue destruction occurs.

The integration of periodontal and systemic assessment may also improve communication between dental and medical professionals. For women with PCOS, oral health should not be considered an isolated aspect of well-being. Maintaining periodontal health may contribute to improved overall health management and quality of life.

Limitations

Several limitations should be considered when interpreting the findings. PCOS is a heterogeneous condition, and the severity of metabolic and hormonal abnormalities varies considerably among patients. Factors such as body mass index, smoking status, dietary habits, oral hygiene, medication use, and socioeconomic characteristics may also influence periodontal health.

In addition, cross-sectional observations cannot establish a direct causal relationship between PCOS and periodontal disease. Longitudinal studies with larger samples are needed to determine whether improvement in systemic metabolic parameters is accompanied by sustained periodontal improvement.

Future research should also investigate specific inflammatory and molecular pathways that may connect PCOS with periodontal tissue changes. Such investigations could help identify biomarkers capable of predicting periodontal treatment response.

Conclusion

Women of reproductive age with PCOS may exhibit clinically significant periodontal inflammation in association with systemic endocrine and metabolic abnormalities. The presence of PCOS should therefore be considered when evaluating periodontal risk and planning preventive or therapeutic interventions.

The clinical management of chronic initial periodontitis in these patients should be individualized and should combine effective local periodontal treatment with assessment of relevant systemic factors. Professional plaque control, improvement of home oral hygiene, regular periodontal monitoring, and appropriate interdisciplinary cooperation represent important components of an optimized therapeutic strategy.

A comprehensive approach may improve control of periodontal inflammation and contribute to greater periodontal stability. Further prospective studies are required to clarify the biological mechanisms linking PCOS and periodontal disease and to establish evidence-based protocols specifically adapted to women with PCOS.

Declarations

Ethical approval: The final manuscript should include the name of the institutional ethics committee and approval number after the study protocol has received ethical approval.

Informed consent: Written informed consent should be obtained from all participants before inclusion in the study.

Conflict of interest: The authors should declare any potential conflicts of interest.

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Data availability: Data availability should be reported according to the requirements of the target journal and the applicable institutional policies.

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