

Associations between menstrual cycle and gum disease

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Abstract

Background: In clinical practice, a common issue observed among adolescent girls undergoing puberty is a condition known as puberty gingivitis. This condition presents with symptoms such as swollen gums, gum inflammation, and bleeding, which tend to appear and disappear in cycles corresponding to the phases of the menstrual cycle. These recurring symptoms highlight a link between hormonal changes during puberty and oral health. Hormonal fluctuations, particularly those involving estrogen and progesterone, have a substantial impact on dental health, resulting in disorders such as menstrual gingivitis. These biological aspects emphasize the need for a full knowledge of the mechanisms behind menstrual gingivitis and its larger implications for periodontal health.

Objective: To review the association between menstrual cycle and gum disease, and to determine the specific hormones causing these conditions.

Methods: This study was conducted by methodically searching for a variety of literature types that were relevant to the subject matter being discussed as references. The design of this research is literature review. The study was done in the end of 2024.

Results: Menstrual gingivitis is gum inflammation caused by hormonal changes, particularly estrogen and progesterone, during the menstrual cycle. It is common in puberty and the luteal phase, with adolescents being more susceptible. Regular oral care and awareness of hormonal effects can help prevent it.

Conclusion: Menstrual gingivitis is caused by hormonal fluctuations and aggravated by stress, resulting in repeated gum inflammation. Teenagers and women are especially vulnerable during puberty and menstruation. To promote periodontal health and overall well-being, effective therapy includes treating hormone shifts, stress, and oral hygiene issues

Keywords: Menstrual Cycle; Gum Disease; Health Care; Public Health; Health Risk

1. Introduction

Hormonal fluctuations that occur throughout a woman's life can significantly influence various aspects of her health, including her oral health. One such manifestation of this hormonal shift is menstrual gingivitis, a condition that involves inflammation of the gums that typically occurs around the time of a woman's menstrual cycle. This is an example of how hormonal changes can affect the body's inflammatory responses and lead to alterations in the health of the oral tissues.

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The two main hormones involved in menstrual gingivitis are estrogen and progesterone, which have a substantial impact on blood circulation and immune function in the gums. These hormones make the gingival tissues more sensitive, which in turn increases the risk of bacterial plaque buildup and irritation. As a result, individuals may notice symptoms such as swelling, redness, and bleeding gums [1][2].

The hormonal effects are especially pronounced during specific phases of a woman's life, including puberty, menstruation, pregnancy, and menopause. During these periods, hormonal levels fluctuate significantly, which can aggravate gingival sensitivity and contribute to inflammation. At the time of menstruation, the rise and fall in estrogen and progesterone levels can cause more noticeable oral health issues. This can lead to gums becoming inflamed and more vulnerable to bacterial damage, with a decreased ability to recover, making treatment necessary in some cases. The hormonal changes that occur during the menstrual cycle also affect the composition of saliva, potentially increasing the likelihood of developing gingivitis or other oral health conditions [3].

This review seeks to give a comprehensive study of menstrual gingivitis by combining findings from different research and investigating clinical symptoms, underlying mechanisms, and contributory factors. It also seeks to highlight the broader implications of hormonal health on periodontal health by examining case studies and existing literature. This study emphasizes the need of a multidisciplinary approach to enhancing patient treatment for individuals suffering from menstrual gingivitis and other hormone-related oral health difficulties

2. Methods

This study is a literature review conducted at the end of 2024, which involved systematically searching for relevant literature using keywords and Boolean operators (AND, OR, AND NOT) in journals or articles published between 2019 and 2024. The search focused on terms like "menstrual cycle and gum disease" OR "menstruation and gingivitis." The inclusion criteria were original research published in the last 6 years, available in full text and open access, and in English, while the exclusion criteria included non-English literature, reviews, inaccessible or non-open-access articles, and those older than 6 years. Data was gathered by comprehensively reading and extracting details such as the title, author, year, research aims, methodology, and findings, which were then analyzed to develop conclusions and recommendations addressing the research questions. The literature was filtered based on title and abstract, and the full text was evaluated to ensure it met the defined criteria.

3. Discussion

Menstrual gingivitis, defined as gum inflammation produced by hormonal variations during the menstrual cycle, exemplifies the link between systemic hormones and dental health. This condition is mostly caused by high levels of estrogen and progesterone, which enhance vascular permeability and blood flow in gingival tissues, resulting in inflammation even in the absence of significant plaque formation [2][3]. Studies have demonstrated that hormonal shifts make gingival tissues more sensitive to bacterial presence, as evidenced by the increased incidence of pathogens such as *P. intermedia*, which thrive on hormonal substrates [4][5].

Progesterone contributes to inflammation by enhancing the production of prostaglandins and stimulating the movement of polymorphonuclear leukocytes to the gingival area. Additionally, progesterone supports the growth of anaerobic bacteria, such as *Prevotella intermedia*, which utilize this hormone as a nutrient source. Estrogen, on the other hand, influences the proliferation and keratinization of gingival epithelium while also promoting inflammation, even in the absence of significant plaque. Menstrual gingivitis commonly manifests a few days prior to menstruation, indicating that the underlying cause may be the elevated levels of progesterone. It is well-established that progesterone levels rise in the luteal phase, just before the onset of menstruation [4][12].

The condition's effects are most noticeable throughout puberty, when estrogen and progesterone levels fluctuate more dramatically. Puberty gingivitis, a subtype of hormonal gingivitis, is distinguished by swelling, redness, and gingival tissue overgrowth, particularly in girls aged 10 to 13, which corresponds to peak hormonal shifts [9]. Menstrual gingivitis develops during the luteal phase of the cycle, when progesterone levels are at their peak, causing symptoms like bleeding and gingival hypertrophy [10].

Adolescents are especially vulnerable because of poor oral hygiene habits combined with increased hormone sensitivity [8]. The return of gingivitis during the menstrual cycle, even in people who maintain appropriate oral care, highlights the importance of hormonal changes over local irritants [11].

These findings highlight the importance of a comprehensive strategy to controlling menstrual gingivitis. Consistent oral hygiene routines and professional interventions like prophylaxis to reduce plaque accumulation. Furthermore, boosting awareness about the influence of hormonal shifts on dental health can encourage people to take preventive steps during high-risk periods of the menstrual cycle.

Table 1 Summary of study results

No.	Author Name, Year	Objective	Research Result
1.	Sathish A. et al., 2022	This study aims to examine how endogenous and exogenous female sex hormone fluctuations affect a woman's periodontal health over the course of her lifetime. It focuses on the effects of hormonal changes on the periodontium during menopause, puberty, pregnancy, and the use of oral contraceptives. It also looks at periodontal care techniques that are specific to each stage of a woman's life. Additionally, it explores periodontal management strategies tailored to each phase of a woman's life.	The findings reveal that female sex hormones significantly affect periodontal tissues by altering inflammatory responses, collagen metabolism, and the microbial environment. Although there is conflicting evidence about the effectiveness of periodontal care in lowering unfavorable pregnancy outcomes, pregnancy exacerbates periodontal problems. Compared to earlier formulations, modern oral contraceptives have minimal impact on gingival inflammation. Menopause-related osteoporosis and polycystic ovarian syndrome present complex interaction with periodontal health. The study emphasizes the importance of individualized oral hygiene and periodontal care to mitigate the effects of hormonal fluctuations on the periodontium.
2.	Setijanto, R. et al., 2019	The study sought to investigate the occurrence of gingivitis and its relationship with oral hygiene levels during various stages of the menstrual cycle in female dentistry students who were presumed to have good knowledge of oral hygiene practices. The study aims to determine the profile of gingivitis before, during, and after menstruation.	Gingivitis was more common during the premenstrual period (24.5%) than the menstrual phase (4.7%), and it was absent during the postmenstrual phase. Although most subjects exercised sufficient oral care (94.3% premenstrual, 88.7% menstrual), hormonal alterations during the premenstrual period led to considerable gingival inflammation. In contrast, oral hygiene conditions were not significantly affected by the menstrual cycle phases.
3.	Angelova S, 2022	The aim of the study was to assess the oral and dental health of a 10-year-old female diagnosed with precocious puberty. It investigates how elevated levels of steroidal sex hormones during this period affect gingival inflammation and dental health, emphasizing the importance of a multidisciplinary care approach.	Clinical measurements such as the Plaque Index (PLI), Gingival Index (GI), and Papillary Bleeding Index (PBI) revealed that the child had significantly widespread plaque-related gingival irritation. Gingival inflammation was connected to systemic hormonal variables associated with precocious puberty, despite adequate oral hygiene measures. Optimizing oral health in such cases requires coordinated efforts among dental, pediatric, and endocrinology professionals.
4.	Boyopati R, et al., 2021	The purpose of the study was to examine the effects on the periodontium of changes in female sex hormones during puberty, menstruation, pregnancy, and menopause. Highlighting the interaction between hormonal changes and periodontal health, focusing on the exaggerated inflammatory response to dental plaque under various hormonal influences.	The periodontium is impacted by hormonal changes that occur throughout puberty, menstruation, pregnancy, and menopause. This causes increased gingival inflammation even when there is little plaque buildup. Puberty and pregnancy showed a pronounced inflammatory response due to elevated estrogen and progesterone levels, while menopause was associated with decreased bone density and oral changes like dry mouth, which exacerbates periodontal issues. During these phases, hormone-associated gingivitis is usually curable with appropriate dental hygiene and hormonal balance. Understanding and implementing these systemic aspects into dental care strategies is essential for comprehensive oral health management.

5.	Moharir A, et al., 2024	The goal of this study is to evaluate how common premenstrual syndrome (PMS) is and explore its oral and periodontal effects among systemically healthy women of reproductive age who attend a dental hospital in Pune. Also to assess their awareness of PMS and identify specific oral symptoms experienced during the premenstrual phase, such as bad breath, gum bleeding, mouth ulcers, changes in taste, and a burning sensation.	39% of individuals had PMS symptoms, with women under 30 having a higher prevalence. 59% of respondents reported oral changes during the premenstrual period, including gum bleeding (9%), burning sensations (5%), altered taste (11%), ulcers (16%), and bad breath (18%). Furthermore, 63% reported behavioral and social issues connected with PMS. Hormonal variations, particularly those involving progesterone, have been recognized as probable causes of oral health problems such as gum inflammation.
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4. Conclusion

This study suggests that there is a link between menstrual cycle and gum disease or medications. Menstrual gingivitis is caused by hormonal fluctuations in the early years of puberty, resulting in repeated gum inflammation. Female teenagers are significantly vulnerable to puberty and menstruation gingivitis. To promote periodontal health and overall well-being, effective therapy includes treating hormone shifts, stress, and oral hygiene issues.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest declared by authors in this study.

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