e-ISSN: 3026-1473

CROWN
Journal of Dentistry and Health Research

Journal website: https://phlox.or.id/index.php/crown

Gingivitis and Oral Health Diseases Related to Pregnancy

Rio Talebessy[1*], Steffi Cecilia[2]

[1]Dentist, WM Dental Care, Ambon, Indonesia

[2]Department of Obstetrics and Gynecology, J Leimena General Hospital, Ambon, Indonesia

ARTICLE INFO

Keywords:
Dental infection
Estrogen
Gingivitis
Pregnancy
Progesterone

***Corresponding author:**
Rio Talebessy

E-mail address:
rio.tbessy@gmail.com

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.59345/crown.v1i1.51

ABSTRACT

Pregnancy gingivitis is a common condition characterized by gum inflammation, swelling, and bleeding. Hormonal fluctuations during pregnancy can increase susceptibility to dental infections, particularly in teeth and gums. Factors such as hormonal fluctuations, morning sickness, dietary changes, heightened gum sensitivity, and decreased dental care practices can contribute to this issue. Although hormonal changes do not directly cause dental infections, they can heighten the susceptibility to gum issues and potentially exacerbate the progression of dental infections. This review provides a comprehensive description of pregnancy gingivitis and its contributing factors. The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding gingivitis and hormonal changes in pregnancy. The search was performed using the terms: (1) "gingivitis" OR "gingivitis pregnancy" OR "gingival inflammation" AND (2) "pregnancy". Within the scope of the review, a total of three quantitative studies were incorporated. In summary, gingivitis during pregnancy is a condition characterized by hormonal fluctuations, particularly heightened levels of estrogen and progesterone. These fluctuations can affect gum health, leading to heightened blood circulation, sensitivity to plaque formation, and changes in gum size and shape.

1. Introduction

Both dental plaque and endogenous steroid hormones have been identified as factors that lead to gingival inflammation during pregnancy.[1] Pregnant individuals are more susceptible to dental and oral complications, such as dental infections. The observed phenomenon might be attributed to hormonal fluctuations that occur during pregnancy, hence exerting an impact on the oral health of individuals, particularly in relation to the condition of teeth and gums. Several factors have been identified that may contribute to an increased susceptibility to tooth infection during pregnancy. These factors include hormonal fluctuations, morning sickness, alterations in dietary habits, heightened gum sensitivity, and a decrease in dental care practices during pregnancy.[2,3]

The elevation of hormones, namely estrogen and progesterone, over the course of pregnancy, can induce alterations in oral tissue, rendering teeth and gums more susceptible to infection and inflammation. Pregnancy gingivitis is a frequently encountered illness during gestation, presenting with symptoms such as gum inflammation, swelling, and bleeding. Pregnancy gingivitis may manifest as a result of heightened gum sensitivity to bacterial plaque.[3-5]

Nevertheless, it is important to note that hormonal changes per se do not directly induce dental infections. However, they can heighten the susceptibility to gum

issues, which, if not well addressed, can subsequently impact dental well-being. Inflammatory and hemorrhagic gingival tissues can serve as a potential gateway for bacterial infiltration into the oral cavity, hence potentially exacerbating the progression of dental infections.[6-8] The objective of this review is to provide a comprehensive description of gingivitis during pregnancy as well as an analysis of the various factors that contribute to its occurrence.

2. Methods

The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding gingivitis and hormonal changes in pregnancy. The search was performed using the terms: (1) " gingivitis" OR "gingivitis pregnancy" OR "gingival inflammation" AND (2) "pregnancy". The literature is limited to clinical studies and published in English and Indonesian. The literature selection criteria are articles published in the form of original articles, observational studies, or experimental studies about gingivitis in pregnancy and hormonal changes. studies were conducted in a timeframe from 2000-2023, and the main outcome was gingivitis in pregnancy. Meanwhile, the exclusion criteria were studies that were not related to gingivitis in pregnancy, the absence of a control group, and duplication of publications. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations.

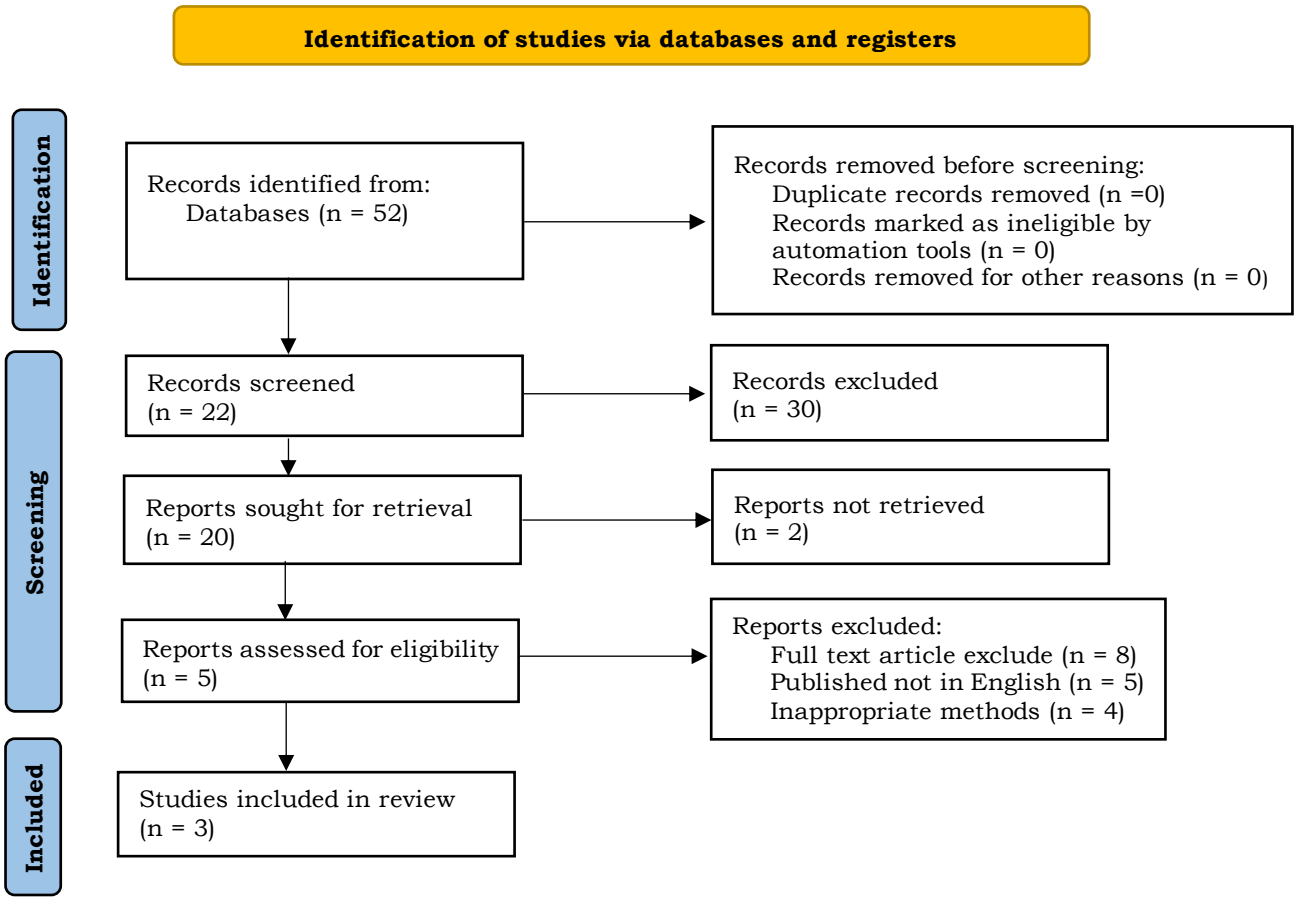

Figure 1. PRISMA flowchart.

3. Results and Discussion

Within the scope of the review, a total of three quantitative studies were incorporated (Table 1). Furthermore, the study failed to provide data regarding potential deviations from the intervention, potential bias in outcome measurement, and potential bias in the selection of reported outcomes.

Table 1. Characteristics of included studies.

Authors	Assessment methods	Results
Gonzalez-Jaranay et al.[9]	Clinically assessed gingival inflammation and probing depth (mean depth and % sites with depth >3 mm	Gingival Index increased ($p<0.001$) throughout pregnancy (baseline, 56.7%±0.20; 21–23 weeks, 66.36%±0.17; 34–36 weeks, 74.5%±0.18)
Kahetty et al.[10]	The study consisted of an interview and an oral examination. Type 3 examination was followed. Simplified oral hygiene index (OHI-S), gingival index, community periodontal index, and TNs index were used.	The pregnant women showed poor oral hygiene, with a mean OHI-S score of 2.68. Gingivitis was prevalent in almost all the pregnant and nonpregnant women. It was found to be more severe in pregnant women, with a mean gingival score of 1.25. A definite increase in gingivitis was found from Trimester II to Trimester III.
Wijaya et al.[11]	The gingival index was used to assess gingivitis during pregnancy.	Gingivitis was found most frequently in third-trimester pregnancy (47.5%) and mild gingivitis.

Gingivitis observed during pregnancy can be attributed to hormonal fluctuations, particularly the heightened levels of estrogen and progesterone that manifest during the gestational period. Hormonal fluctuations have the potential to impact the health of the gums, leading to the development of a condition commonly referred to as pregnant gingivitis. The hormonal fluctuations experienced during pregnancy, including the elevation of estrogen and progesterone levels, have several effects on gum tissue. These effects include heightened blood circulation to the gums, heightened sensitivity to plaque formation, and alterations in the size and shape of the gums during pregnancy.[12-13]

The precise etiology underlying the heightened occurrence of gingival inflammation during pregnancy remains inadequately elucidated. The potential impact of elevated levels of estrogen and progesterone on the periodontium during pregnancy and its association with the observed clinical manifestations have been a subject of interest since the 1970s. The predominant estrogen found in plasma is estradiol, which is biosynthesized by the ovaries and placenta. Progesterone, the main progestin in females, is produced by the corpus luteum, placenta, and adrenal cortex. During the course of pregnancy, there is a consistent rise in the levels of both hormones, mostly as a result of the ongoing secretion of the corpus luteum in the early stages, followed by the placenta in subsequent stages.[14]

During the final stage of the third trimester, the concentrations of progesterone and estrogen in the bloodstream reach their highest levels, measuring at 100 and 6 ng/mL, respectively. These levels are significantly elevated compared to the concentrations detected during the menstrual cycle, with progesterone being 10 times higher and estrogen being 30 times higher. The physiological effects of estrogen on the gingiva were also demonstrated in animal models. Gingival hypertrophy was observed when the serum estrogen concentrations in animal models were reduced to levels below 100 pg/mL with the administration of aromatase inhibitors. The clinical recovery of the gingiva was observed upon the administration of estradiol. The findings indicate that estrogen exerts a significant impact on several physiological processes occurring in the gingiva, such as cell proliferation and differentiation. This influence can be observed through both direct and indirect mechanisms. The investigation into the effects of sex

steroids on the periodontium is substantiated by the following observations. The localization of estrogen receptor (ER) and progesterone receptor (PgR) in the human periodontium has been documented, suggesting that the periodontal tissue is susceptible to the effects of these hormones. Additionally, endoplasmic reticulum (ER) has been found in several parts of the human periodontium, such as the gingiva and periodontal ligament, in earlier research. [15,16]

Moreover, during the initial trimester, the occurrence of nausea and vomiting commonly experienced in pregnancy, commonly referred to as morning sickness, can lead to the erosion of tooth enamel due to the presence of stomach acid. The occurrence of stomach acid ascending into the oral cavity during emesis or acid reflux is responsible for this phenomenon, whereby the acid has the potential to inflict harm upon the tooth enamel. Enamel constitutes the rigid and defensive outer coating that envelops the dental structure. Nevertheless, the enamel has the potential to undergo corrosion or erosion due to exposure to acid. The interaction between stomach acid and tooth enamel can lead to the erosion of enamel, hence increasing tooth sensitivity, vulnerability to decay, and the possibility of dental health complications. Pregnancy gingivitis is a prevalent illness that may manifest during pregnancy and is characterized by the presence of symptoms such as gum swelling, inflammation, bleeding upon tooth brushing, and discomfort. While pregnancy gingivitis is typically characterized by moderate symptoms, inadequate management of this condition may lead to the progression of a more severe kind of gum disease called periodontitis. [14,16]

4. Conclusion

Gingivitis during pregnancy is a condition characterized by hormonal fluctuations, particularly heightened levels of estrogen and progesterone. These fluctuations can affect gum health, leading to heightened blood circulation, sensitivity to plaque formation, and changes in gum size and shape.

5. References

1. Wu M, Chen S, Jiang S. Relationship between gingival inflammation and pregnancy. Mediators Inflamm. 2015; 2015: 623427.
2. Gare J, Kanoute A, Orsini G, Goncalves LS, Alshehri FA. Prevalence, severity of extension and risk factors of gingivitis in a 3-month pregnant population: a multicenter cross-sectional study. J Clin Med. 2023; 12(9): 3349.
3. Holmstrup P, Plemons J, Meyle J. Non-plaque-induced gingival diseases. J. Periodontol. 2018; 89 (Suppl. S1): S28–S45.
4. Katarzyńska-Konwa M, Obersztyn I, Trzcionka A, Mocny-Pachońska K, Mosler B. Oral status in pregnant women from post-industrial areas of upper silesia in reference to occurrence of: preterm labors, low birth weight and type of labor. Healthcare. 2020; 8: 528.
5. Jang H, Patoine A, Wu TT, Castillo DA, Xiao J. Oral microflora and pregnancy: A systematic review and meta-analysis. Sci Rep. 2021; 11: 16870.
6. Massoni RSDS, Aranha AMF, Matos FZ, Guedes OA, Borges H. Correlation of periodontal and microbiological evaluations, with serum levels of estradiol and progesterone, during different trimesters of gestation. Sci Rep. 2019; 9: 11762.
7. Paul O, Arora P, Mayer M, Chatterjee S. Inflammation in Periodontal disease: possible link to vascular disease. Front Physiol. 2020; 11: 609614.
8. Dommisch H, Staufenbiel I, Schulze K, Stiesch M, Winkel A. Expression of antimicrobial peptides and interleukin-8 during early stages of inflammation: An experimental gingivitis study. J Periodontal Res. 2015; 50: 836–45.
9. Gonzalez-Jaranay M, Tellez L, Roa-Lopez A, Gomez-Moreno G, Moreu G. Periodontal status during pregnancy and postpartum. PLoS One. 2017; 12(5): e0178234.
10. Kahetty M, Kumbhar S, Patil S, Patil P. Oral hygiene status, gingival status, periodontal status, and treatment needs among pregnant

and nonpregnant women: A comparative study. J Indian Soc Periodontol. 2018; 22(2): 164-70.

11. Wijaya D, Hanum NA, Handayani A. Relationship between gestational age and severity of gingivitis. J Kesehatan Gigi. 2019; 6(2): 126-9.
12. Erchick DJ, Rai B, Agrawal NK, Khatry SK, Katz J. Oral hygiene, prevalence of gingivitis, and associated risk factors among pregnant women in Sarlahi District, Nepal. BMC Oral Health 2019; 19: 2.
13. Srinivas SK, Parry S. Periodontal disease and pregnancy outcomes: time to move on? J. Women's Health 2012; 21: 121–5.
14. Raju K, Berens L. Periodontology and pregnancy: an overview of biomedical and epidemiological evidence. Periodontology 2000. 2021; 87: 132–42.
15. Balan P, Brandt B, Chong Y, Crielaard W, Wong M. Subgingival microbiota during healthy pregnancy and pregnancy gingivitis. JDR Clin Transl Res. 2021; 6: 343–51.
16. Gare J, Kanoute A, Meda N, Viennot S, Bourgeois D. Periodontal conditions and pathogens associated with pre-eclampsia: a scoping review. Int J Environ Res Public Health. 2021; 18: 7194.