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Prenatal dental care and periodontal health: a concise systematic review

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Abstract

Introduction: Periodontal disease is a chronic infection caused by a bacterium that stimulates the immunoinflammatory response, leading to inflammation of the gingival and tooth support tissue, resulting from the pathogenesis of the microorganism and the host's response. Studies have investigated the association between periodontal conditions and possible complications for pregnant women and newborns. **Objective:** Analyzed the main consequences of periodontal disease during pregnancy and childbirth, as well as changes involving newborns, in order to elucidate the importance of prenatal dental care. **Methods:** The present study was followed by a systematic literature review model, according to the PRISMA rules. Clinical studies included case reports, retrospective, prospective and randomized trials. The quality of the studies was based on the GRADE instrument. The risk of bias was analyzed according to the Cochrane instrument. **Results:** A total of 104 articles were found. A total of 48 articles were evaluated in full, and 20 were included and discussed in this study. The overall assessment did not result in significant risks that could compromise the science of the present study. According to the GRADE classification, the studies were of moderate quality. Gingivitis, periodontitis, and tooth loss were found to be associated with premature birth. Periodontal disease can increase the chance of negative neonatal and maternal outcomes, with fetal growth restriction, vulvovaginitis, and premature rupture of the membrane being the main effects. **Conclusion:** Oral health should be an important focus in the monitoring of pregnant women in all maternal and child health services, making it necessary to incorporate the diagnosis of maternal oral health and periodontal disease for the health of the mother and newborn.

Keywords: Periodontal disease. Chronic infection. Pregnant. Newborn. Prenatal dental care.

Introduction

Periodontal disease (PD) is a chronic infection caused by a bacterium that stimulates the immunoinflammatory response, leading to inflammation of the gingival and tooth support tissue, resulting from the pathogenesis of the microorganism and the host's response [1]. The main manifestations of the disease are gingivitis with an initial inflammatory response and periodontitis, or severe periodontal disease, resulting from long exposure to inflammation and identified by the formation of periodontal calculi and pockets that can lead to the destruction of the periodontal ligament [2].

The systemic response to PD is due to the release of metalloproteinase and prostaglandins, mainly PgE2 [3], which stimulates the production of pharmacologically active cytokines and mediators, such as interleukin 1-beta, IL-6, tumor necrosis factor-alpha. the action of osteoclasts and resorption of dental bone. These cytokines and infectious agents can spread systemically through the bloodstream [4]. In pregnant women, high concentrations of estrogen and progesterone predispose to PD [5]; when associated with poor oral hygiene in a population, PD can affect up to 60% of this group [6].

In this scenario, PD during pregnancy can trigger an exacerbated immune response with high local and systemic concentrations of inflammatory markers [7] and thus increase the risk of systemic changes. Studies have investigated the association between periodontal conditions and possible complications for pregnant women and newborns, indicating the association of this

disease with preterm birth [4].

In this sense, several complications associated with PD, such as gestational diabetes, pre-eclampsia, intrauterine growth restriction, early abortion, premature birth, low birth weight, and increased risk of early neonatal infection are reported in the literature. Therefore, investigating the impact of PD on pregnant women, as well as the negative outcomes for the newborn, is extremely important for health care [8].

Therefore, this concise systematic review study analyzed the main consequences of periodontal disease during pregnancy and childbirth, as well as changes involving newborns, in order to elucidate the importance of prenatal dental care.

Methods

Study Design

The present study was followed by a systematic literature review model, according to the PRISMA rules. Access available at: http://www.prisma-statement.org/

Data sources and research strategy

Clinical studies were included as case reports, retrospective, prospective and randomized trials with qualitative and/or quantitative analysis. Also, some review studies were included. Initially, the keywords were determined by searching the DeCS tool and later verified and validated by the MeSH system (Medical Subject Headings, the US National Library of Medicine) to achieve consistent search.

MeSH Terms

The main MeSH Terms were *Periodontal disease. Chronic infection. Pregnant. Newborn. Prenatal dental care*. The literature search was conducted through online databases PubMed, Google Scholar, Ovid, Scopus, Web of Science and Cochrane Library.

Study quality and risk of bias

The quality of the studies was based on the GRADE instrument, with randomized controlled clinical studies, prospective controlled clinical studies, and studies of systematic review and meta-analysis listed as the studies with the greatest scientific evidence. The risk of bias was analyzed according to the Cochrane instrument.

Results

Literature Review and Discussion

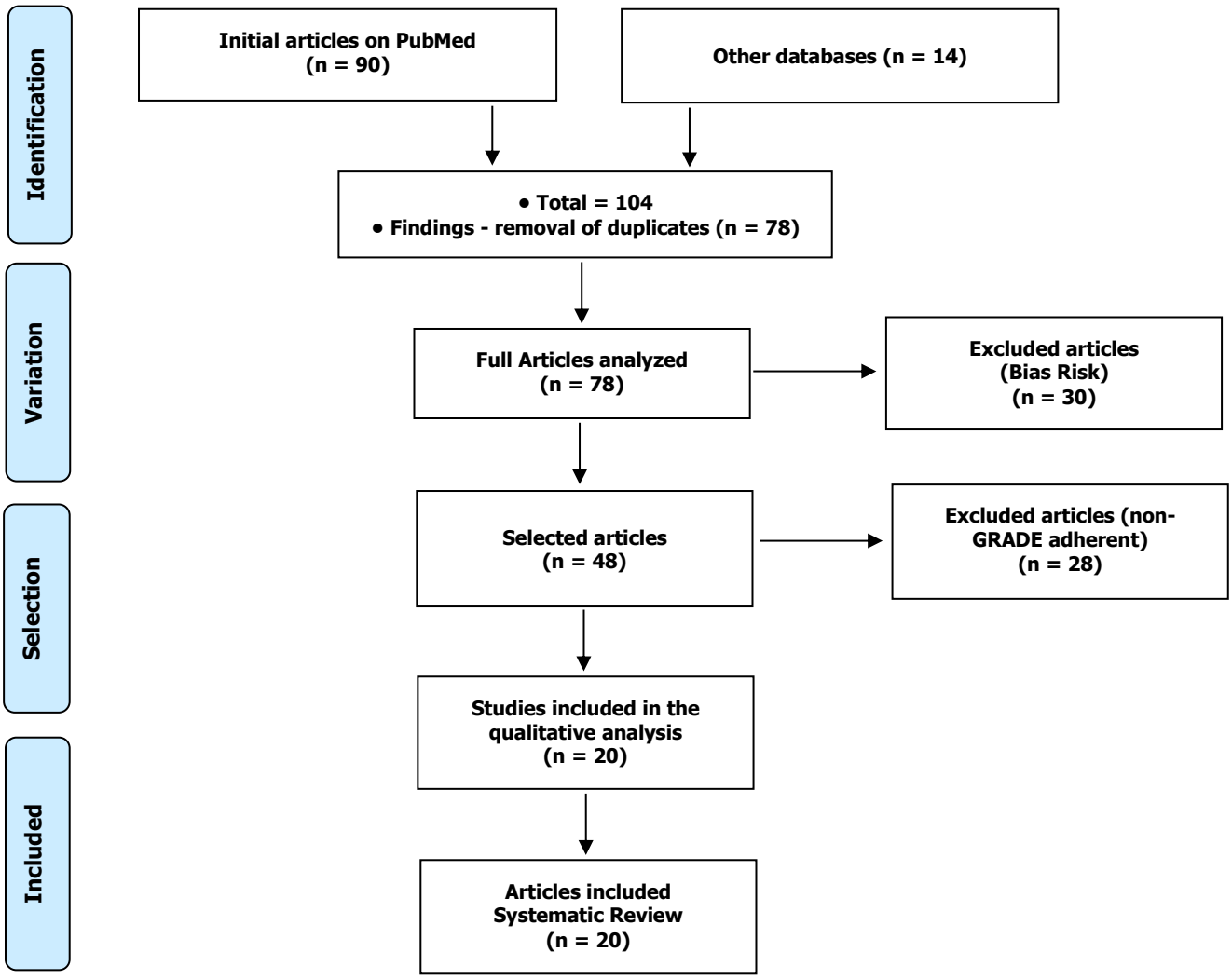
A total of 104 articles were found involving prenatal dental care and periodontal health. Initially, was held the exclusion of existing title and duplications following the interest described in this work. After this process, the summaries were evaluated and a new exclusion was held. A total of 48 articles were evaluated in full, and 20 were included and discussed in this study (**Figure 1**). Considering the Cochrane tool for risk of bias, the overall assessment did not result in significant risks that could compromise the science of the present study. According to the GRADE classification, the studies were of moderate quality.

In this context, preterm birth is a multifactorial health problem that represents a serious public health problem worldwide. In recent years, there has been an increase in scientific evidence suggesting associations between oral health status, particularly periodontal disease and tooth loss, and an increased risk of systemic diseases and various adverse pregnancy outcomes. Thus, a prospective study with 111 pregnant women (36 cases, 75 controls) analyzed the association between oral health indicators and premature birth in Mexico. Mean age was similar between cases and controls (24.29 ± 5.42 versus 24.89 ± 5.67). As a result, it was observed that gingivitis, periodontitis, and tooth loss were associated with premature birth [9].

Also, oral diseases were identified as a risk factor for low birth weight. In this regard, a cross-sectional observational study involving 300 pregnant women (mean age 25 years) who delivered infants in the last 24 hours with an age group of 21-30 years analyzed the association of maternal periodontal health with prematurity and low birth weight in newborns. When analyzing the frequency of brushing, it was observed that approximately 40% brushed three times a day while 35% brushed twice a day while the remaining 25% brushed only once a day. No statistical significance was obtained when comparing brushing frequency with gingival health. Likewise, no association was found between periodontal health and the birth of premature children with low birth weight [10].

Besides, a retrospective cohort study (142 medical records of pregnant women) investigated the impact of PD on the health of pregnant women and complications during pregnancy and childbirth, as well as negative outcomes for the newborn (such as infections, prematurity, low birth weight, and fetal growth restriction). Among women diagnosed with PD, the odds ratio for vulvovaginitis was 3.45 times higher (OR=3.45, p-value=0.050) and 5.59 times higher for premature rupture of membranes (OR=5.59; p-value=0.017). For newborns, the chance of fetal growth restriction was 11.53 times greater for pregnant women with PD (OR=11.53, p=0.041). Therefore, periodontal disease increased the chance of negative neonatal and maternal outcomes, with fetal growth restriction, vulvovaginitis,

Figure 1. The selection process of scientific articles.



and premature rupture of the membrane being the main effects [11].

Also, a cross-sectional study of 404 women investigated the prevalence and factors associated with periodontal disease in pregnant Sudanese women. The mean gestational age was 30.0 (8.7) weeks. The mean age and parity were 27.0 (5.7) years and 1.6 (1.7), respectively. Ninety-seven (24.0%) of these 404 women had periodontal disease, which was mild, moderate, and severe in 49 (12.1%), 36 (8.9%), and 12 (3.0%) women, respectively, while 307 (76.0%) women did not have periodontal disease. Age, parity, education, and brushing were not associated with periodontitis, however, lower gestational age was associated with periodontal disease (p=0.011) [12].

Furthermore, a study with 311 pregnant women evaluated the periodontal health of pregnant women and investigated the association of periodontal conditions with demographic and socioeconomic characteristics, as well as medical and dental history. The presence of visible plaque remained the main determinant of gingival bleeding (OR=2.91, CI=1.91-4.48). Pregnancy status in the first trimester was also a predictor, with a lower prevalence of gingival bleeding observed in the second (OR=0.87, CI=0.77-0.99) and third (OR=0.82, CI= 0.73-0.93) quarters [13].

Also, an observational, cross-sectional study in Australia assessed the knowledge, attitudes, and practical behavior of Australian midwives regarding the periodontal health of pregnant women to inform about interprofessional prenatal care. One hundred responses were analyzed, including rural (n=23) and urban (n=77) midwives. Eighty percent of midwives agreed that maternal dental care can positively affect pregnancy outcomes. The use of fluoride toothpaste (19.1%) was wrongly answered to prevent gum disease more often than to control psychological stress (7.9%), a correct answer. Rural midwives demonstrated a significantly higher knowledge score (p=0.001) and significantly more positive practice behaviors to oral health (p=0.014) than urban midwives. Australian midwives have positive attitudes towards prenatal oral health but misunderstand the etiology and prevention of gum disease [14].

Based on these clinical studies, it is emphasized that periodontal disease in pregnancy begins with dental plaque and is accentuated by the action of hormones, mainly estrogen and progesterone, triggering greater vulnerability of the dental tissues, mainly due to edema and increased tissue vascularization dental [15,16]. Furthermore, there is a relationship between chronic diseases with low inflammation and an increased risk of developing gestational and neonatal comorbidities, which can be aggravated when associated with PD [6,17]. In this context, a small group of bacteria, predominantly gram-negative, anaerobic, or microaerophilic, that colonize the subgingival region [18].

In this scenario, the Ministry of Health in Brazil emphasizes the importance of oral hygiene for pregnant women, suggesting a healthier diet and frequent brushing, with at least one dental appointment during pregnancy. Furthermore, the Ministry of Health recommends guidelines and dental procedures during pregnancy to help protect the health of the embryo, fetus, and pregnant woman [19]. Authors observed that, in Brazil, the social representation of pregnant women about the gestational process is still a natural phenomenon, contributing to the lack of care during pregnancy, non-adherence and even avoidance of prenatal programs, and discharge incidence of severe gestational disorders [20].

Conclusion

Severe Periodontal Disease increased the chance of negative neonatal and maternal outcomes, such as fetal growth restriction, vulvovaginitis, and premature rupture of the membrane. Thus, oral health should be an important focus in the monitoring of pregnant women in all maternal and child health services, making it necessary to incorporate the diagnosis of maternal oral health and periodontal disease for the health of mother and newborn.

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Data sharing statement

No additional data are available.

Conflict of interest

The authors declare no conflict of interest.

References

1. Rabinerson D, Krispin E, Gabbay-Benziv R. [DENTAL CARE DURING PREGNANCY]. Harefuah. 2018 May;157(5):330-334. Hebrew. PMID: 29804341.
2. George A, Johnson M, Blinkhorn A, Ajwani S, Ellis S, Bhole S. Views of pregnant women in South Western Sydney towards dental care and an oral-health program initiated by midwives. Health Promot J Austr. 2013;24(3): 178–184. 10.1071/HE13040.
3. Chapple IL, Matthews JB. The role of reactive oxygen and antioxidant species in periodontal tissue destruction. Periodontology 2000. 2007;43: 160–232. 10.1111/j.1600-0757.2006.00178.x.
4. Offenbacher S, Jared HL, O'Reilly PG, Wells SR, Salvi GE, Lawrence HP. Potential pathogenic mechanisms of periodontitis associated pregnancy complications. Ann Periodontol. 1998;3(1): 233–250. 10.1902/annals.1998.3.1.233.
5. Keirse MJ, Plutzer K. Women's attitudes to and perceptions of oral health and dental care during pregnancy. J Perinat Med. 2010;38(1): 3–8. 10.1515/JPM.2010.007.
6. Xiong X, Buekens P, Fraser WD, Beck J, Offenbacher S. Periodontal disease and adverse pregnancy outcomes: a systemic review. BJOG. 2006;113(2): 135–143. 10.1111/j.1471-0528.2005.00827.x.
7. Laine MA. Effect of pregnancy on periodontal and dental health. Acta Odontol Scand. 2002;60(5): 257–264. 10.1080/00016350260248210.
8. Mendes HS, Peraçoli JC. Condições de saúde bucal das gestantes atendidas na atenção primária do município de Botucatu—SP e seu conhecimento sobre a importância da saúde bucal na gestação. Dissertação (mestrado). Universidade Estadual Paulista Júlio de Mesquita Filho. 2014.
9. Márquez-Corona ML, Tellez-Girón-Valdez A, Pontigo-Loyola AP, Islas-Zarazúa R, Robles-Bermeo NL, Gonzalez-López BS, Medina-Solís CE. Preterm birth associated with periodontal and dental indicators: a pilot case-control study in a developing country. J Matern Fetal Neonatal Med. 2021 Mar;34(5):690-695. doi: 10.1080/14767058.2019.1613363. Epub 2019

May 7. PMID: 31035800.

10. Jyotirmay, Kumar A, Gulati S, Kumari S, Nazeer J, Singh P. Association of maternal periodontal health with preterm birth and a low birth weight among newborns: A cross-sectional study. Natl J Maxillofac Surg. 2021 Jan-Apr;12(1):67-71. doi: 10.4103/njms.NJMS_135_20. Epub 2021 Mar 16. PMID: 34188403; PMCID: PMC8191548.
11. Figueiredo MGOP, Takita SY, Dourado BMR, Mendes HS, Terakado EO, Nunes HRC, Fonseca CRBD. Periodontal disease: Repercussions in pregnant woman and newborn health-A cohort study. PLoS One. 2019 Nov 22;14(11):e0225036. doi: 10.1371/journal.pone.0225036. PMID: 31756178; PMCID: PMC6874354.
12. Salih Y, Nasr AM, Ahmed ABA, Sharif ME, Adam I. Prevalence of and risk factors for periodontal disease among pregnant women in an antenatal care clinic in Khartoum, Sudan. BMC Res Notes. 2020 Mar 11;13(1):147. doi: 10.1186/s13104-020-04998-3. PMID: 32160921; PMCID: PMC7066801.
13. Krüger MSDM, Casarin RP, Gonçalves LB, Pappen FG, Bello-Correa FO, Romano AR. Periodontal Health Status and Associated Factors: Findings of a Prenatal Oral Health Program in South Brazil. Int J Dent. 2017;2017:3534048. doi: 10.1155/2017/3534048. Epub 2017 Mar 29. PMID: 28465684; PMCID: PMC5390572.
14. Nguyen JG, Nanayakkara S, Holden ACL. Knowledge, Attitudes and Practice Behaviour of Midwives Concerning Periodontal Health of Pregnant Patients. Int J Environ Res Public Health. 2020 Mar 27;17(7):2246. doi: 10.3390/ijerph17072246. PMID: 32230709; PMCID: PMC7177424.
15. Khan NS, Ashraf RN, Noor S, Mahmood-ur-Rahman, Mashhadi SF, Rashid Z, et al. Association of maternal periodontitis with low birth weight in newborns in a tertiary care hospital. J Ayub Med Coll Abbottabad. 2016;28(1): 120–125.
16. Ananth CV, Andrews HF, Papapanou PN, Ward AM, Bruzelius E, Conicella ML, et al. History of periodontal treatment and risk for intrauterine growth restriction (IUGR). BMC Oral Health. 2018;18(1): 161 10.1186/s12903-018-0623-2.
17. Soucy-Giguère L, Tétu A, Gauthier S, Morand M, Chandad F, Giguère Y, et al. Periodontal disease and adverse pregnancy outcomes: a prospective study in a low-risk population. J Obstet Gynaecol Can. 2016;38(4): 346–350. 10.1016/j.jogc.2016.02.012.
18. Chanomethaporn A, Chayasadom A, Wara-Aswapati N, Kongwattanakul K, Suwannarong W, Tangwanichgapong K, et al. Association between periodontitis and spontaneous abortion: a case control study. J Periodontol. 2019;90(4): 381–390. 10.1002/JPER.18-0174.
19. Brasil. Ministério da Saúde. Centro Brasileiro de Análise e Planejamento. Assistência à gestação, ao parto e ao puerpério: diferenciais regionais e desigualdades socioeconômicas In: Pesquisa Nacional de Demografia e Saúde da criança e da mulher–PNDS 2006: dimensões do processo reprodutivo e da saúde da criança. Brasília: Ministério da Saúde; 2009. p. 151–170.
20. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Atenção ao pré-natal de baixo risco. Brasília: Editora do Ministério da Saúde; 2012. (Série A. Normas e Manuais Técnicos) (Cadernos de Atenção Básica; n° 32).