Original Research
Periodontics

Factors associated with periodontal diseases in pregnancy: Findings of the 2015 Pelotas Birth Cohort Study

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Abstract: Although periodontal disease is common during pregnancy, little is known about socioeconomic, behavioral, or biological determinants related to clinically assessed periodontal condition during this period. We assessed the prevalence of periodontal disease and associated factors in pregnant women. This population-based survey used data used from the 2015 Pelotas Birth Cohort Study, Brazil. Pregnant women expected to give birth between December 2014 and May 2016 were interviewed and clinically examined by trained dentist, with periodontal measures collected in all teeth, six sites per tooth. Outcomes were periodontitis (using the 2012 Centers for Disease Control and Prevention and the American Academy of Periodontology criteria) and gingivitis (by the 2018 European Federation of Periodontology/ American Academy of Periodontology classification). Multivariate hierarchical Poisson regression was used to assess the associations between socioeconomic, systemic, and clinical oral factors and periodontal disease. A total of 2,474 pregnant women participated in the study. Prevalence of periodontitis and gingivitis was 14.63% and 21.67%, respectively. Lower educational level and calculus were associated with higher prevalence periodontitis and gingivitis (P<0.05). Smoking was also associated with periodontitis (P=0.05), and lower frequency of toothbrushing (P=0.005) with gingivitis. Periodontal disease, especially gingivitis, was prevalent in pregnant women and their determinants were socioeconomic, environmental, and clinical oral health factors.

Keywords: Periodontitis; Gingivitis; Oral Health; Socioeconomic factors; Observational study.

Introduction

Periodontal diseases are chronic multifactorial inflammatory diseases associated with dysbiotic plaque biofilm and considered an important public health problem,[1,2] with social and financial implications. Besides the high global prevalence and effects on tooth-supporting tissues,[3] gingivitis and periodontitis have systemic effects and are therefore associated with various systemic diseases and conditions.[4,5] In this sense, periodontitis has been associated with preterm birth, low birth weight or small for gestational age infant, and preeclampsia,[6-8]

although with conflicting results among studies.[9] On the other hand, changes in sex steroid hormones during pregnancy impact and exacerbate the inflammatory response of the gingiva, even when little plaque is present.[10] Despite the high hormonal changes during pregnancy, it is possible to treat periodontal disease during pregnancy and to reestablish periodontal health.[11]

Pregnancy is a period of considerable physiological and hormonal changes in a woman's body, including the oral cavity.[12] Previous studies have found that the prevalence and severity of gingival inflammation is higher in pregnant women than in post-partum women.[4,13] Moreover, pregnant women present bleeding on probing, increased gingival probing depths, and elevated gingival crevicular fluid.[10] A cross-sectional study evaluated the diagnostic criteria used in a variety of epidemiologic studies of periodontitis in pregnant woman and showed that the frequency of periodontitis ranged from 25.0% to 90.2%.[14] Recently, a systematic review[15] showed that the prevalence of periodontitis in pregnancy was 40% using the criteria by Centers for Disease Control and Prevention (CDC) and the American Academy of Periodontology (AAP).[16] The exact biological mechanisms linking pregnancy and periodontal heath are still unclear, but there are some theories about this relationship.[6] Changes in sex steroid hormones affect the immunobiology of tissues. The depression of the maternal immune system, increased vascularity, cellular changes, and alterations in subgengival biofilms are involved in the pathogenesis of gingival inflammation in pregnancy.[17]

Besides biological factors, social and behavioral determinants can also explain the prevalence of periodontal disease in pregnant women. Low socioeconomic status, which is mediated by lower utilization of dental services, has been associated with worse oral health in pregnancy.[18] The literature shows that pregnant women have low use of dental services, even when evidence of oral disease is present.[19] Care-seeking and utilization of dental services are also influenced by health literacy, perceptions of the importance of oral health, and knowledge in treating pregnant women.[20] In fact, lack of knowledge and perceived importance of dental visits during pregnancy have been associated with low use of dental services.[21]

The high prevalence of periodontal disease, especially gingivitis, in pregnant women, combined with the fact that periodontal disease is preventable and treatable, highlights the importance of understanding the factors associated with these diseases in epidemiological studies. Also, poor oral health during pregnancy, including presence of periodontal disease, dental caries, and lack of dental visits can negatively affect the pattern of dental visits of their offspring.[22] Although previous studies have assessed the prevalence of periodontal disease in pregnancy, most did not use an established criterion of periodontal disease, and some presented a moderate to high risk of bias.[15] This study is important for health care providers to plan curative and preventive measures during pregnancy. It will also provide information on the care of the baby's oral health. Therefore, this population-based survey assessed the prevalence of periodontal disease and associated factors in pregnant women.

Methodology

Design and sample

This population-based survey presents a secondary analysis of the 2015 Pelotas (Brazil) Birth Cohort Study, from Pelotas, in southern Brazil. Detailed methodological aspects of the cohort is published elsewhere.[23] The study is reported according to STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Briefly, Pelotas has an estimated population of 344,000 inhabitants and 123 public and private health services providing antenatal care, which were visited or contacted weekly to identify pregnant women. Approximately 99.0% of all births in the city occur in the public health service.[23] In relation to eligibility criteria, all pregnant women expected to give birth between December 2014 and May 2016 and residing in the urban area of the city were invited to participate in the study.

This study was approved by the Human Subject Ethics Board of Federal University of Pelotas (CAAE

registration number: 26746414.5.0000.5313) and was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2013. All pregnant women signed a written informed consent form.

Data collection

Women in the second trimester of pregnancy were visited at home by the health team (an interviewer and a dentist) that applied a questionnaire and conducted a full-mouth examination using standardized international criteria for oral health surveys.[24]

Fifteen trained and calibrated examiners performed the oral exam using artificial light, periodontal probe model PCP2,[25] and dental mirror. Calculus, probing pocket depth (PPD), bleeding on probing (BOP), and clinical attachment level (CAL) were recorded in six sites per tooth, excluding third molars. PPD was defined as the distance between the free gingival margin and the bottom of the pocket/sulcus. BOP was recorded during PDD assessment, and it was classified as present or absent. CAL was defined as the distance from cementoenamel junction to the bottom of the pocket or sulcus.

Training involved definition of the clinical parameters and standardization of measuring instruments and techniques. Initially, a benchmark dental examiner conducted a 4-hour session with theoretical explanation of the clinical parameters used in the study. Examiners were trained for calculus, PPD, and BOP assessment. The calibration process was only performed for CAL by repeated measurements in 20 individuals. Reproducibility was assessed by the intra-class correlation coefficient (ICC), and the values for intra-examiner and inter-examiner for CAL ranged from 0.74 to 0.91.

Outcome variables

Periodontal status according to presence of gingivitis and periodontitis were the outcomes of this study. Gingivitis was assessed by BOP and categorized according the 2018 European Federation of Periodontology/ American Academy of Periodontology (EFP/AAP) case definition:[2] "healthy" and "gingivitis" (≥ 10% of bleeding sites). Periodontitis was classified by the epidemiological 2012 CDC/AAP criteria based on PPD and CAL recordings from at least two interproximal sites of different teeth.[16] According to this classification,[16] periodontal status was defined as healthy or mild, moderate, or severe periodontitis. Mild periodontitis was defined as ≥ 2 interproximal sites with CAL ≥ 3 mm and > 2 interproximal sites with PD ≥ 4 mm, not on the same tooth, or one site with PPD ≥ 5 mm. Moderate periodontitis was defined as ≥2 interproximal sites with CAL ≥ 4 mm, not on the same tooth, or ≥ 2 interproximal sites with PPD ≥ 5 mm. Severe periodontitis was defined as ≥ 2 interproximal sites with CAL ≥ 6 mm, not on the same tooth, and at least one interproximal site with PPD ≥ 5 mm. The outcome periodontitis was categorized as "periodontal health" and "periodontitis" (mild, moderate, and severe categories).

Independent variables

Pregnant women answered a 'face-to-face' questionnaire on sociodemographic, systemic, and oral health characteristics. During the calibration process, the questionnaire was tested on 20 individuals. The questionnaire provided information on age, skin color, and educational level. Age was categorized in "<20 years", "20-34 years", and "≥ 35 years". Skin color was dichotomized as "white" and "non-white" according to self-report. Educational level was collected as years of formal education and was categorized in "0–4 years", "5–8 years", "9–11 years", and "> 12 years".

Medical characteristics were self-reported ("no" and "yes") and included body mass index (BMI), hypertension, diabetes, and smoking status. Pre-gestational BMI was calculated according to the formula: weight/ square of the height (kg/m^2).[26] Then, BMI was categorized as "low weight, < 18.5 kg/m^2", "normal weight, < 25.0 kg/m^2", "overweight, 25.0–29.9 kg/m^2", and "obesity, ≥ 30.0 kg/m^2".[26]

Oral health characteristics were measured by toothbrushing frequency, use of dental floss, use of dental service, and dental calculus. Toothbrushing frequency was assessed with the question: "In general, how often do you brush your teeth a day?" Answers were categorized as "twice or three times a day" or "once a day or less". Flossing was assessed with the question: "Do you floss?" with answer options "yes" and "no". Use of dental service was collected through the question: "During pregnancy, did you

visit a dentist?" with answers options "yes" and "no". Dental calculus was classified as "absent" or "present" if detected in at least one site.

Statistical analysis

Data analysis was performed using Stata (StataCorp. 2012. Stata Statistical Software: Release 12.1.; StataCorp LP, College Station, USA). Descriptive statistics were used to describe and compared (chi-square test) sociodemographic, systemic, and oral health characteristics of the sample.

Hierarchical Poisson regression analysis was used to assess the association between independent variables and outcomes (periodontitis and gingivitis). Data were presented as prevalence ratio (PR) and 95% confidence interval (CI). Four statistical steps were tested according to a conceptual hierarchical framework[18] (Figure): Step 1 included demographic and socioeconomic variables; Step 2 included Step 1 variables plus systemic variables; and Step 3 included Step 2 variables plus clinical oral health measures. Model building was performed using a stepwise method with backward selection approach. Variables showing associations with P value ≤ 0.25 after adjustment were retained in the analysis.

Results

Of the 3,125 eligible women for the oral health sub-study, 3100 (99.2%) were included. The excluded women (n = 25) refused to participate. Of the women examined, 2496 delivered babies that were included in the perinatal study of the 2015 Pelotas Birth Cohort (response rate of 80.1%). However, only 2,474 pregnant women were assessed in our study, since 22 of them had missing data on periodontal measures. The prevalence of periodontitis and gingivitis was 14.63% (n = 362; CI = 0.13–0.16) and 21.67% (n = 536; C I= 20.05–23.34), respectively. When considering the severity of periodontal disease, 9.50% (n = 235; CI = 8.37–10.72), 4.89% (n = 121; CI= 4.07–5.81), 0.24% (n = 6; CI = 0.008–0.05) of the participants had mild, moderate, and severe periodontitis, respectively.

Distribution of periodontal status according to sociodemographic, systemic, and oral health characteristics is presented in Table 1. In general, mean age was 28 years [standard deviation (SD) = 6.50], most participants reported being white (71.60%), and 36.68% had 9 to 11 years of schooling. Most participants were of normal weight (49.07%) and did not report hypertension (74.93%), diabetes (90.86%), or smoking (86.90%). Regarding oral health characteristics, most pregnant women reported high toothbrushing frequency (96.96%), regular flossing (62.43%), and visiting a dentist during pregnancy (63.08%). In addition, the prevalence of dental calculus was 34.24%. Periodontitis and gingivitis were associated with lower education level, non-white skin color, smoking, not flossing, not using dental services during pregnancy, and dental calculus ($p < 0.05$). The presence of gingivitis was also associated with a low frequency of daily toothbrushing ($p = 0.002$).

Table 2 presents the adjusted association between independent variables and outcomes (periodontitis and gingivitis), using hierarchical Poisson regression. For periodontitis, lower educational level, smoking,

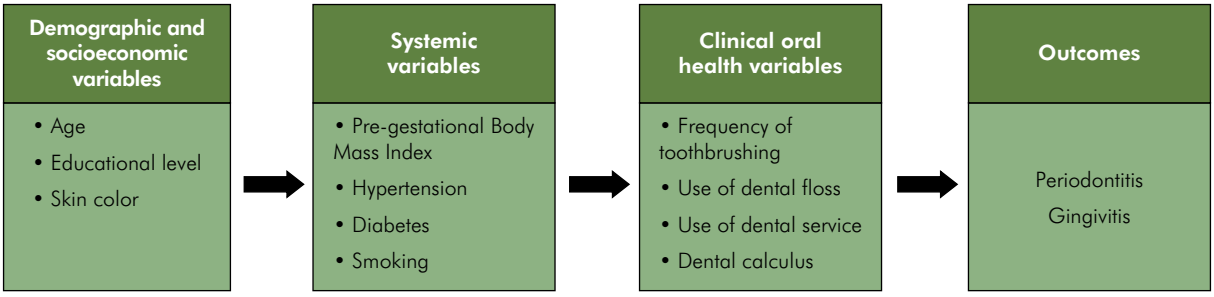

Figure. Theoretical model for the study of associated factors of periodontal diseases in pregnant women.

Table 1. Distribution of pregnant women with periodontitis (2018 EFP/AAP classification) and gingivitis (2012 CDC/AAP criteria) and independent variables (n = 2,474).

Variables	Total sample		Periodontitis			Gingivitis		
	n (%)	95%CI	n (%)	95%CI	p-value*	n (%)	95%CI	p-value*
Sociodemographic variables								
Age (years)					0.185			0.020
< 20	312 (12.61)	11.32–13.98	35 (11.22)	7.93–15.25		59 (18.91)	14.71–23.70	
20–34	1,780 (71.95)	70.13–73.71	268 (15.06)	13.42–16.80		411 (23.09)	21.14–25.11	
35–46	382 (15.44)	14.03–16.92	59 (15.45)	11.97–19.46		66 (17.28)	13.62–21.44	
Educational level (years)					< 0.001			< 0.001
0–4	161 (6.51)	33.21–37.01	36 (22.36)	16.17–29.58		56 (34.78)	27.45–42.67	
5–8	537 (21.71)	20.10–23.39	81 (15.08)	12.16–18.39		131 (24.39)	20.81–28.25	
9–11	907 (36.68)	34.77–38.61	156 (17.20)	14.79–19.81		223 (24.59)	21.81–27.52	
> 12	868 (35.10)	33.21–37.01	89 (10.25)	8.31–12.46		125 (14.40)	12.13–16.91	
Skin color					0.030			< 0.001
White	1,765 (71.60)	69.77–73.37	242 (13.71)	12.13–15.40		345 (19.55)	17.72–21.47	
Non-white	700 (28.40)	26.62–30.22	120 (17.14)	14.42–20.14		191 (27.29)	24.01–30.74	
Systemic health variables								
Pre-gestational BMI					0.061			0.126
Low weight (< 18.5 kg/m^2)	79 (3.26)	2.58–4.04	16 (20.25)	12.04–30.79		24 (30.38)	20.52–41.75	
Normal weight (18.5–24.9 kg/m^2)	1,189 (49.07)	47.06–51.08	159 (13,37)	46.15–51.91		244 (20.52)	18.25–22.93	
Overweight (25.0–29.9 kg/m$^{2)}$	698 (28.81)	27.01–30.65	102 (14.61)	12.07–17.45		150 (21.49)	15.07–28.76	
Obesity (≥ 30 kg/m^2)	457 (18.86)	17.32–20.47	82 (17.94)	14.53–21.77		109 (23.85)	16.21–32.96	
Hypertension during pregnancy					0.532			0.172
No	1,853 (74.93)	73.17–76.62	276 (14.89)	13.30–16.59		413 (22.29)	20.41–24.25	
Yes	620 (25.07)	23.37–26.82	86 (13.87)	11.24–16.84		122 (19.68)	16.61–23.02	
Diabetes during pregnancy					0.565			0.407
No	2,247 (90.86)	89.65–91.96	326 (14.51)	13.07–16.03		491 (21.85)	20.15–23.61	
Yes	226 (9.14)	8.03–10.34	36 (15.93)	11.41–21.36		44 (19.47)	14.51–25.24	
Smoking during pregnancy					0.001			<0.001
No	2.149 (86.90)	85.50–88.20	295 (13.73)	12.29–15.25		439 (20.43)	18.74–22.19	
Yes	324 (13.10)	11.79–14.49	67 (20.68)	16.40–25.50		96 (29.63)	24.70–34.92	

Continue

Continuation

Clinical oral health variables								
Frequency of toothbrushing					0.099			0.002
Twice or three times a day	2,390 (96.96)	96.20–97.59	346 (14.48)	13.08–15.95		509 (21.30)	19.67–22.99	
Once a day or less	75 (3.04)	2.40–3.79	16 (21.33)	19.71–23.03		27 (36)	25.23–47.91	
Flossing					0.001			< 0.001
Yes	1,539 (62.43)	60.48–64.35	198 (12.87)	11.23–14.64		284 (18.45)	16.54–20.48	
No	926 (37.57)	35.64–39.51	164 (17.71)	15.30–20.32		252 (27.21)	24.36–30.20	
Use of dental service during pregnancy					0.002			0.048
Yes	1,548 (63.08)	61.13–64.99	202 (13.05)	11.41–14.82		318 (20.54)	18.55–22.64	
No	906 (36.92)	35.01–38.86	159 (17.55)	15.12–20.18		217 (23.95)	21.20–26.86	
Dental calculus					< 0.001			< 0.001
Absent	1,627 (65.76)	63.85–67.63	205 (12.60)	11.02–14.31		288 (17.70)	15.87–19.64	
Present	847 (34.24)	32.36–36.14	157 (18.54)	31.04–37.54		248 (29.28)	26.23–32.47	

*p-value was considered statistically significant when < 0.05 (Chi-square test); CI: confidence interval; BMI: Body Mass Index.

and dental calculus were significantly associated with high prevalence of periodontal disease ($p < 0.05$). A high prevalence of gingivitis was also associated with low educational level ($p < 0.01$). In addition, prevalence of gingivitis was higher in pregnant women that reported low toothbrushing frequency and who had dental calculus ($p < 0.05$).

Discussion

This study assessed the prevalence of periodontal diseases and associated factors in pregnant women. The prevalence of periodontitis and gingivitis was 14.63% and 21.67%, respectively. Lower educational level, smoking, and dental calculus were associated with periodontitis. Our findings also demonstrated that lower educational level, dental calculus, and lower toothbrushing frequency were associated with a higher prevalence of gingivitis. There are few population-based surveys assessing socioeconomic, systemic, and clinical factors associated with periodontal diseases in pregnant women.[15] In this sense, our results contribute to the understanding of the periodontal needs of this population.

Although previous studies consistently indicate that gingival inflammation is a highly prevalent condition, there is heterogeneity in the reported prevalence of gingivitis in pregnant women.[4,17] This variation may reflect difference in gingivitis definitions of studies and different populations studied.[2,17] A cross-sectional study showed a prevalence of 84.4% of gingival bleeding in pregnant women attended in a referral dental service.[27] However, our findings revealed a lower prevalence of gingivitis (21.67%), which can be explained by the case definition used. A gingival inflammatory condition ("gingivitis site") does not necessarily equate to a gingivitis case.[2] The absence of a cut-off criteria does not allow to distinguish a patient with a certain extent/severity of inflamed gingival sites from a patient affected by gingivitis.[2] Thus, it is essential to assess the prevalence of gingivitis using a recognized case definition, such as the 2018 EFP/AAP classification in epidemiological studies.

This study also showed that 14.63% of pregnant women had periodontitis and most participants

Table 2. Adjusted association of independent variables with periodontitis and gingivitis in pregnant women, determined using hierarchical Poisson regression.

Variables	Periodontitis		Gingivitis	
	PR (95%CI)	p-value*	PR (CI 95%)	p-value*
Step 1 – Sociodemographic variables				
Age (years) (ref. < 20)		0.227		
20–34	1.41 (0.93–2.16)			
35–46	1.39 (0.82–2.38)			
Educational level (years) (ref. > 12)		0.093		< 0.001
0–4	1.78 (1.02–3.07)		2.10 (1.40–3.14)	
5–8	1.58 (1.00–2.51)		1.68 (1.20–2.36)	
9–11	1.99 (1.33–2.97)		1.77 (1.30-2.42)	
Skin color (ref. white)		0.510		0.973
Non-white	1.09 (0.83–1.45)		0.99 (0.80–1.23)	
Step 2 – Systemic variables				
Pre-gestational BMI (ref.< 18.5 kg/m^2)				
Normal weight (18.5–24.9 kg/m^2)				
Overweight (25.0–29.9 kg/m$^{2)}$				
Obesity (≥ 30 kg/m^2)				
Hypertension during pregnancy (ref. no)				0.117
Yes			0.82 (0.64–1.05)	
Diabetes during pregnancy (ref. no)				
Yes				
Smoking during pregnancy (ref. no)		0.005		0.306
Yes	1.62 (1.16–2,27)		1.15 (0.87–1.53)	
Step 3 – Clinical oral health variables				
Frequency of toothbrushing (ref. twice or three times a day)		0.176		0.051
Once a day or less	1.47 (0.84–2.57)		1.51 (1.00–2.27)	
Use of dental floss (ref. yes)				
No				
Use of dental service during pregnancy (ref. yes)				
No				
Dental calculus (ref. absent)		0.032		< 0.001
Present	1.34 (1.02–1.75)		1.49 (1.21–1.83)	

*p-value was considered statistically significant when < 0.05; PR: prevalence ratio; CI: confidence interval.

presented mild periodontitis when considering the severity of the disease. A recent study showed a wide variation in the occurrence of periodontitis depending on the diagnostic criteria used, and a prevalence of 66.3% of periodontitis according to CDC/AAP criteria.[14] Periodontal disease is a chronic condition that increases with age and does not necessarily occur at a constant rate if left untreated.[28] Globally, the highest prevalence of periodontal disease occurs between 50 and 69 years of age.[29]

We evaluated a young population for the occurrence of periodontitis, especially considering its more advanced stages. A prospective study showed that prevalence of periodontitis in 31-year-old adults was 11.60%.[30] Although our study presented similar prevalence, this finding should be interpreted with caution since a different classification of periodontal disease was used. Moreover, it is well established that gingivitis in pregnancy is limited and does progress to periodontitis, and the periodontal attachment loss requires a chronic inflammatory state of the gingiva that lasts longer than pregnancy.[17]

Lower educational level was associated with periodontitis and gingivitis in pregnant women. Education is an indicator of socioeconomic position (SEP) that measure material resources and standard of living.[31] In addition, educational level assesses the transition from the SEP of parents to one's adulthood SEP.[32] Therefore, it indicates the long-term influences of early life circumstances on adult health.[32] Education also reflects non-economic social characteristics, such as literacy and problem-solving skills.[31] The knowledge and skills obtained through education can make people more receptive to health education messages and to access appropriate health services.[32] These theoretical bases explain the finding that pregnant women from lower SEP, including lower educational level, have worse health.

Smoking was also associated with periodontitis in pregnant women. Epidemiologic studies have demonstrated that smoking is one of the major environmental risk factors for periodontal disease.[10] The effects have been shown to be dose-dependent and can be particularly evident in younger people.[33] There are some hypotheses about the mechanisms by which cigarette smoking affects periodontal tissues, including qualitative changes of the subgingival biofilm and damage to the inflammatory and immune responses and the healing capacity of the periodontium.[34-36] Although smoking prevalence decreases during pregnancy, there are socioeconomic inequalities in smoking habits, and smoking has been more prevalent in non-white and low-income pregnant women.[37]

The prevalence of gingivitis and periodontitis were associated with dental calculus. Classical studies have demonstrated that calculus deposits seem to have a secondary effect in periodontal diseases by providing a rough surface conducive to further plaque accumulation.[38] Furthermore, calculus had a stronger predictive value for periodontitis development than plaque at age 31 years in a population-based prospective cohort study,[33] corroborating our findings. The lower frequency of toothbrushing was also associated with prevalence of gingivitis in pregnant women. Gingivitis has been closely related to the maturation of the plaque and, consequently self-performed mechanical plaque control is the most important preventive measure for gingivitis.[39] A randomized clinical trial demonstrated that self-performed mechanical plaque control at 12 h or 24 h intervals were sufficient to maintain gingival health in subjects with no or limited clinical attachment loss.[40] However, our results showed that toothbrushing once a day or less was associated with high prevalence of gingivitis. In fact, there is no true consensus as to the optimal frequency of toothbrushing. Most individuals are usually unable to properly remove dental plaque with daily brushing, and disease appears to be related more to the quality of cleaning than its frequency.[41]

Our study presents some strengths that should be highlighted. The study data was robust, as a representative sample of pregnant women participating in a cohort, ensuring socioeconomic, systemic, and oral conditions, was used. In addition, we used recognized periodontal disease classifications for the outcomes. A gingivitis case was established according to the 2018 EFP/AAP classification and a periodontitis case was defined by the 2012 CDC/AAP criteria, which are preferred for epidemiological studies worldwide, including in recent epidemiologic trends.[42-44] The reliability of the data was ensured since clinical data were collected by trained examiners and a full-mouth examination protocol was carried out in six sites per tooth. Finally, this study included important systemic variables, such as BMI, diabetes, and hypertension that may increase the prevalence of periodontal diseases.

Our study also had some limitations. The cross-sectional design prevents the establishment of causality between predictors and periodontal outcomes.

However, cross-sectional studies are important designs for identifying risk indicators for inclusion in longitudinal assessments. In addition, periodontal disease was dichotomized as present and absent due to the low prevalence of periodontitis in our sample, and consequently we did not define disease severity. Disease severity defines the level of tissue destroyed and damaged attributable to periodontitis and has also been an important indirect assessment of the level of individual susceptibility.[1] Future longitudinal studies should be carried out considering the severity of periodontal diseases during pregnancy. Poor oral health conditions during pregnancy not only affect the women themselves, but they can have negative impact on their offspring,[24] which highlights the importance of investigations on oral health conditions during this period of life.

Conclusions

Periodontal disease, especially gingivitis, was prevalent in pregnant women, and the determinants were similar to those of the general population. Socioeconomic, systemic, and clinical oral health factors were associated with periodontal disease during pregnancy. These findings may be useful for identifying priorities and tailoring oral health promotion efforts for pregnant women. In addition, the factors associated with periodontal disease are recognized determinants of other oral and systemic diseases. Thus, further research and program development considering common risk factors is needed to tackle oral health inequalities during pregnancy.

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