

## Factors Associated with Gingival Bleeding in Puerperal Women at the Public Maternities in Salvador- BA, 2011

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### Abstract

The aim of this study was to identify factors associated with gingivitis, measured by gingival bleeding on probing in postpartum women of the public hospitals in Salvador, Bahia, in 2011. A structured questionnaire was applied to 309 women followed by a complete periodontal examination that allowed, among other procedures, the identification of the presence of plaque, gingival margin evaluation and presence of gingival bleeding on probing. A proportion of 33.8% of the sites examined showed bleeding on probing. Most showed more than 25% of the sites probed with visible plaque (72%) and 58.3% of the sample was diagnosed with gingivitis. There was a positive association between the visible plaque index and the diagnosis of gingivitis (PR = 1.62 95% CI 1.25 to 2.15), 38.5% had some type of change in self-care during pregnancy; however, only 29.7% reported having visited a dentist. The group with lower education had 23% more gingivitis compared to the group that studied more than eight years (PR = 1.23 95% CI 1.01 to 1.49). Noteworthy was the high prevalence of gingivitis in postpartum women, reinforcing the importance of motivation and maintenance of oral hygiene in preventing or reducing the severity of inflammatory changes mediated by hormonal changes during pregnancy.

**Keywords:** Gingivitis; Pregnancy complications; Periodontitis

### Introduction

During pregnancy, women experience physiological changes that affect many body systems. These changes occur in early pregnancy and are largely modulated by hormonal, immunological or metabolic factors [1]. The alterations in endocrine profile have a material impact to pregnancy [2]. Plasma concentration of estrogen and progesterone is respectively 30 and 10 times larger in this period than in the menstrual cycle, so that the biological impact of these on periodontium is enhanced [3,4]. These effects are already being felt in the second month of pregnancy and in the eighth month plasma levels rise and gingival inflammation reaches its greatest severity. Regression was observed after delivery [2]. The presence of specific receptors for those hormones in periosteum fibroblasts, and that of the periodontal ligament in the osteoblasts and the gingival tissue suggests that these are targets [4]. Thus, the identification of various types of gingival changes associated with altered secretion thereof, has led to a growing interest in this area [2]. The hormonal changes that occur during pregnancy can also alter the response of periodontium to local etiologic factors locais 2-4 and influence the synthesis of cytokines, triggering a series of events characteristic of tissue inflammation [5]. The primary etiologic agent in the development of periodontal disease is the biofilm. Thus, proper brushing and flossing are essential in preventing inflammatory changes [1,6]. It also appears that sickness during pregnancy can reduce the self-care with oral hygiene<sup>6</sup> and that most pregnant women do not seek dental and/or are not oriented as to its importance [1,7,8]. Poor hygiene can be further aggravated according to the socioeconomic status or emotional stress of women [9]. In studies by Honkala et al., [7] Cross et al., [9] and Hashim et al., [1] it was found positive associations between low educational level of pregnant women and the occurrence of periodontal disease, and this synergy can be explained by the lack of oral hygiene practices among mothers with low education levels. Periodontal disease, besides causing damage to the teeth and gingival mucosa of pregnant women, has been linked to preterm delivery and birth of babies with low weight [9,10], factors of great relevance in the context of public health-related increases in infant mortality

rates, neurological sequelae and unsatisfactory neurodevelopment. If periodontal disease increases the incidence of low birth weight, it seems clear that attention to the periodontal health of the pregnant women should start having a space within the routine perinatal actions [10]. In this context, the aim is to identify factors associated with gingival bleeding in puerperal women in the public hospitals of Salvador, Bahia, in 2011.

### Materials and Methods

A cross-sectional study was developed with data from "Project GeraVIDA – A multicenter study on periodontal diseases in pregnant women and preterm/low birth weight - a case study control", in which the presence of factors associated with gingival bleeding in postpartum women was evaluated, in two public maternity hospitals of Salvador, BA. The study population analyzed in the period from April to December 2011, amounted to 309 women. For this study, power calculation was done a posteriori, corresponding to 72%, assuming a prevalence of 34% of the event, a significance level of 95% and an OR of 1.7 in the main pool. The postpartum women, after signing an informed consent, participated in the interview and periodontal examination. Medical history was assessed and those who had systemic change, those who needed antibiotic prophylaxis for dental procedures or who

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underwent periodontal treatment during pregnancy were excluded from the study. The interview consisted identification data, current and previous obstetric history, socioeconomic data, oral hygiene, access to dental care during pregnancy, self-perception of oral health and self-care. Regarding socioeconomic factors family income, education level, economic status, number of children, number of people per household and number of rooms per household and occupation were considered. In self-care were considered the flossing, the number of daily brushings, and change in oral hygiene during pregnancy and visit to the dentist in the period. After that, a specialized dental surgeon held so blind full periodontal examination ( $\kappa = 0.78$ ). The evaluation was conducted at six sites per tooth, consisting of four proximal measures (angles in mesiobuccal, mesiolingual, distobuccal and distolingual), a measure in the midbuccal region and a measure in the mid-lingual. Williams millimeter probe was used (Trinity, SP, Brazil), with a help of a mouth mirror and gauze. The plaque index and the gingival bleeding were considered, assessing the presence or absence of bleeding upon probing the gingival margin to the most apical extent of penetration of the probe. The proportion of sites with bleeding gums of all sites examined was calculated. For the diagnosis of gingivitis the diagnostic criteria already established in the literature was used, in which those who showed bleeding on probing in more than 25% of the sites examined were considered with gingivitis [3]. The descriptive analysis was made, then proceeded to bivariate analysis for the occurrence of gingivitis among participants, according to the several covariables studied, calculating as a measure of association the prevalence ratio and confidence interval. Finally, a multivariate analysis exploratory in nature was performed. In modeling, prevalence ratios (PR) and robust confidence intervals were obtained by Poisson regression, containing all independent variables, without hierarchy, and adopted as the criterion for retaining statistical significance level ( $\alpha = 0.05$ ). Data were entered into EPI-INFO 6.04 and the analysis Stata 11 was used. This research protocol was submitted and approved by the Ethics Committee of the Federal University of Bahia, Judgment No. 067/2010.

## Results

Sample consisted of 309 postpartum women. The mean age was 26.5 years. From the total 60.1% were primiparous and the majority (55.3%) brown, 71.8% reported having a stable relationship or being married, and 86.7% were living in Salvador. In the sample, 182 (58.9%) belonged to class C. As for education, it was observed that 40.1% had completed the third year of high school or more (Table 1). There was a mean of 1.7 children and the mean number of people and rooms per household were respectively equal to 4 and 5 (Table 2). It was observed that 26.2% reported to have worsened the care of oral health, 53.4% reported brushing their teeth three times a day or more. As to flossing, 47.9% said they did not use this. With regard to the visit to the dentist 70.2% report not having visited the dentist during pregnancy (Table 3). In the bivariate analysis, the group with lower education had 23% more gingivitis (PR = 1.23 95% CI 1.01 to 1.49) than the group that studied more than eight years. There was no difference between postpartum women diagnosed with gingivitis as for family income and occupation (Table 4). The highest occurrence of gingivitis was among the postpartum women who reported perceiving gingival bleeding (PR = 1.29 95% CI 1.03 to 1.62). There was no difference in the occurrence of gingivitis between postpartum women who considered their own oral health as poor (PR = 1.04 95% CI 0.85 to 1.27). There was no difference in the diagnosis of gingivitis among the group who reported better oral hygiene habits as well as among the postpartum women who visited the dentist during pregnancy (PR= 0.96 95% CI 0.78 to 1.18) (Table

4). From those who reported a visit to the dentist, only 17.8% received oral hygiene education. The variable positively associated with the occurrence of gingivitis was the presence of visible accumulated plaque (PR = 1.62, 95% 1.25 to 2.15). Postpartum women with more than 25% of the sites probed with visible plaque presented 1.54 times more likely to have gum disease (PR = 2.54 95% CI 1.51 to 4.33).

## Discussion

Most women attended in the postpartum period in Salvador, BA, showed deficiency in caring for the oral health. This fact can be proven by the high rate of visible plaque, present in 72% of the sample and the large percentage of women diagnosed with gingivitis, almost 60% of the population. The occurrence of gingivitis during pregnancy is associated with high levels of gingival bleeding. It was observed that 58.3% of examined women showed more than 25% of the sites probed with bleeding gums, this result being consistent with the variation in the study of Rios et al. [11], 50-100%. The presence of gingival bleeding is characteristic of gingivitis associated to pregnancy manifested by swelling of gums, reddish to dark blue color, smooth and shiny surface, and bleeding on brushing and/or mastication [12]. These changes are common phenomena and are related to biofilm presence in a host physiologically altered as a function of pregnancy [1,7]. Increase in plasma progesterone levels results in increased vascular permeability, gingival edema, increase in gingival crevicular fluid levels and increased production of prostaglandins, which may lead to gingival inflammation [3]. In Nakagawa et al. [13], patients with hormonal changes were evaluated regarding their hygiene habits, bacterial types in sub-gingival biofilm and clinical inflammatory condition of the periodontal tissues. There were differences regarding the presence of gingival bleeding, and this was associated to both the increased presence of the microbe *Prevotella intermedia* as well as a variation in the inflammatory response influenced by hormonal condition present. Different periodontal responses can be observed in pregnant women [14]. This is due to the fact that periodontitis is a multifactorial disease, influenced by different conditions, as factors inherent to the host, individual genetic predisposition and endocrinological changes [14], which were not observed in this study. However, as the biofilm is the main etiological factor, the maintenance of oral hygiene helps in preventing or reducing the severity of inflammatory changes mediated by estrogen and progesterone [1,7]. 26.21% of respondents reported change to worse self-care with oral health, which was also reported by Rios et al. [11]. These may suffer from nausea with the taste of toothpastes and mouthwashes, which may be aggravated by pH reduction induced by oral acid reflux and vomiting during pregnancy [6]. Concerning frequency of dental brushing, 46.6% reported brushing teeth 2 times a day, while 53.4% affirmed brushing 3 times or more, similar to found by Ramos et al. [15], where 58% of pregnant women affirmed brushing the teeth 3 times a day. Regarding dental floss 47.9% did not ordinarily use it, result below the found by Ramos et al., [15], where 66% reported not using dental floss. These data contrast with clinical outcomes. The visible plaque index and gingival bleeding on probing occurred respectively in 72.5% and 58.3%. Furthermore, there was no difference of diagnosis in the gingivitis group of postpartum women who reported best oral hygiene habits. There was a predominance of class C (58.9%), and education was prevalent in the third year of high school education or more (40.1%). This fact may explain the results obtained through interviews regarding oral hygiene during pregnancy. The higher level of education may have led respondents to answer following information deemed correct, even if they were not so executed. It can thus be considered feasible an information bias. Machuca et al., [16] when evaluating the periodontal

	Variables	n	%
Age range	14-26 years	169	54.7
	27 years or more	140	45.3
Ethnicity	White	19	6.2
	Black	114	36.9
	Brown	171	55.3
	Indian/ Yellow	5	1.6
Marital status	Married or similar	222	71.8
	Single/ Divorced/ Widow	87	28.2
Place of residence	Salvador	268	86.7
	Other cities	41	13.3
Family Income	Until 1 Minimum wage	190	61.5
	1-1,99 Minimum wage	61	19.7
	2- 3,99 Minimum wage	30	9.7
	4 or more Minimum wage	28	9.1
Education	No education- Seventh grade	75	24.3
	Eighty grade- until superior education	110	35.6
	University or more	124	40.1
Economic Class	A	8	2.6
	B	52	16.8
	C	182	58.9
	D	54	17.5
	E	13	4.2

Table 1: Socio-demographic characterization of postpartum women treated in public maternities- Salvador, 2011 (N=309).

Variables	Mean	Standard deviation	Minimum value	Maximum value
Age (years)	26.5	6.7	14	45
Family income (reais)	1054.1	769.4	100	5040
Number of children	1.7	1.1	1	7
Number of persons in household	4	1.8	1	14
Numbers of rooms in household	5	1.7	1	11

Table 2: Characterization of postpartum women examined by mean age, family income, number of children, people and rooms in the household, Salvador, 2011 (N=309).

	Variables	n	%
Change of self-care during pregnancy	No changes	190	61.5
	For worse	81	26.2
	For better	38	12.3
Frequency of dental brushing	2 times per day	144	46.6
	3 times or more per day	165	53.4
Use of dental floss	No	148	47.9
	Yes	161	52.1
Visited to the dentist	No	217	70.2
	Yes	92	29.8
Visible plaque index	Until 25% of sites	85	27.5
	More than 25% of sites	244	72.5
Gingival Bleeding index	Until 25% of sites	129	41.7
	More than 25% of sites	180	58.3

Table 3: Change of self-care, frequency of brushing, flossing and visiting the dentist during pregnancy in postpartum women, Salvador, 2011 (n=309).

Variables		No gingivitis n (%)	Presence of gingivitis n (%)	Crude Prevalence rate-PR (95% IC)	Adjusted Prevalence Rate-PR (95% CI)*
Family Income	Until 1Minimum wage	74(38.9)	116 (61.1)	1.13(0.92-1.38)	-
	2 or more Minimum wage	55 (46.2)	64 (53.8)		
Education	No education-Seventh grade	24 (32.0)	51 (68.0)	1.23 (1.01-1.49)	1.60 (1.00-2.89)
	Eight grade or more	105 (44.9)	129 (55.1)		
Change of self-care during pregnancy	Yes	51 (41.8)	71 (58.2)	1.62 (1.25-2.15)	
	No	78 (41.7) 109 (58.3)			
Use of dental floss	No	56 (37.8)	92 (62.2)	1.13 (0.94-1.37)	1.13 (1.01-1.89)
	Yes	73 (45.3)	88 (54.7)		
Visited to the dentist	No	92 (42.2)	125 (57.6)	0.96 (0.78-1.18)	-
	Yes	37 (40.2)	55 (59.8)		
Visible plaque index	Until 25% of sites	78 (34.8)	146 (65.2)	1.62 (1.25-2.15)	2.54 (1.51-4.33)
	More than 25% of sites	51 (60.0)	34 (40.0)		
Gingival Bleeding index	Until 25% of sites	78 (37.1)	132 (62.9)	1.29 (1.03-1.62)	1.72 (1.07-2.94)
	More than 25% of sites	51 (51.5)	48 (48.5)		

\*only p<0.05

**Table 4:** Crude prevalence and adjusted ratio and confidence interval for the association between socio-demographic conditions, factors related to self-care, presence of visible plaque and gingivitis, Salvador, 2011 (N=309).

status of 130 pregnant women and their relationship with clinical and demographic variables, observed a plaque index mean of 58.7%, which increased when the professional level was lower compared to women who worked as liberal professionals or techniques ( $P < 0.01$ ). The plaque index also increased when the level of education was lower ( $P < 0.01$ ) and when the patients lived in rural areas ( $P < 0.00$ ). The mean bleeding index was 68.8% and increased in relation to lower professional level ( $P < 0.02$ ) and when patients lived in urban areas ( $P < 0.00$ ). Gingivitis due to the buildup of plaque in the presence of gingival bleeding was the most characteristic periodontal status in this sample. It was observed that only 17.8% of pregnant women reported having received some guidance for oral hygiene. The minority (29.8%) visited dentist during pregnancy, which is in agreement with Sartorio and Machado [17], and Ramos et al., [15] who found percentages of 39.6% and 32%, respectively. Authors report that demand for oral care occurs only when the patient feels pain [1,7,8] and this complicates the implementation of preventive strategies. There is a need to consider the results presented cautiously, because it is a cross-sectional study, where there is no guarantee of advance time of exposure in relation to the effect. Furthermore, the sampling design was conducted to perform a case-control study. The occurrence of gingivitis among postpartum women, who considered their oral health as poor was similar to those who considered it as excellent, very good, good or fair (PR = 1.04 95% CI 0.85 to 1.27), there indicating that perception of gingival bleeding is not interpreted by the postpartum women as a sign of disease and reinforces the idea that they need proper instructions about the importance of oral hygiene care for their health and the baby's.

## Conclusions

Most postpartum women have gingivitis. The biofilm accumulation

was the main factor associated with the occurrence of bleeding gums. It is evident the need of demystification and the performance of the dentist during the prenatal period.

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