Periodontal Status as Predictor of Prematurity and Low Birth Weight

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Abstract

Objective: *The objective was to verify the relation between periodontal status and prematurity/low birth weight.* ***Methods:*** *a case control study of 211 women, 44 being mothers of children born with weight below 2.500g or gestational age of less than 37 weeks (case group) and 177 mothers of children born with weight of over 2.500g or more and gestational age of 37 weeks or more (control group). The women were invited to reply to a questionnaire during the interview. A single dentist performed a complete periodontal exam in the oral cavity of each participant, including: probing depth, recession, plaque index, bleeding on probing, and clinical attachment loss measurements. Descriptive analysis of the study variables was performed and the statistical significance was calculated at 5%, using the chi-squared test.* ***Results:*** *There was no statistically significant difference in the clinical parameters between the groups.* ***Conclusions:*** *The findings showed no association between periodontal status and prematurity/low birth weight.*

Key Words: Periodontal disease; prematurity/low birth weight; childhood morbidity and mortality; periodontal diagnosis; epidemiology

Introduction

Low birth weight is a risk factor that contributes significantly to infant morbi-mortality. It is known that the newborn's weight and health status are determined by numerous and complex inter-related factors: genetic, demographic, psychosocial, obstetric, nutritional, toxic substances and infections (1). Recently, the hypothesis has been defended, without consensus, that among the various biological factors, periodontal infection represents a potential risk factor for the birth of premature and/or low birth weight (PLBW) babies. (2,3,4) On the other hand, some studies have failed to support this association (5, 6).

In this connection, various studies using different methodologies have been conducted, and as yet, there is no consensus in the literature about the criteria for determining both exposure and effect. Moreover, it would in principle, seem to be important for the clinical periodontal parameters to be able to predict, after clinical exam of the pregnant woman, the extent to which this woman's periodontal status (PS) is compromised, and to be able to use this as an indicator of possible risk for gestational complications.

In view of the above, the objective of the present study was to assess the association between maternal PS, measured by means of clinical periodontal parameters, and PLBW.

Methods

Study population. A total of 221 puerperae, whose deliveries occurred at the Maternity Hospital of Alagoinhas, Bahia, Brazil, comprised the sample of this case-control study, admitting a power to the order of 70% and confidence interval of 95%.

The case group was composed of 44 mothers of newborns, either premature or low birth weight defined as: gestational age below 37 weeks and weight less than 2500 grams, respectively (19), whereas the control group was composed of 177 mothers of newborns with weight of over 2500 grams and gestational age above 37 weeks. All the participants were in a postpartum period for a maximum of 7 days.

Both groups that composed the sample answered questions relative to their socio-demographic characteristics, life style, clinical and family history. The participants had signed the terms of free and informed consent. This study was approved by the Research Ethics Committee of Feira de Santana State University.

Data collection procedures. A single examiner was trained to obtain all the clinical parameters. Intra-examiner calibration was performed before the study began. Reliability was confirmed by taking repeated measurements during the calibration

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sessions and in ~10% of the patients (randomly selected) during the study. The degree of intra-examiner agreement with the measurements employed was classified as very good (0.875 to 0.881 using kappa test).

Three nursing assistants were trained to follow the protocol for initial approach as well as recruitment of and data acquisition from the puerperae for the entire study.

PS assessment was made using the following clinical parameters until 7 days after the delivery: probing depth (PD) (7), clinical attachment loss (CAL) (8), bleeding on probing (BOP) (9) and Plaque Index (PI) (3). Both PD and CAL were recorded at six sites per tooth (mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual and disto-lingual) for all teeth except third molars. CAL was indirectly measured from PD measurement and gingival recession.

Data analysis procedures. A descriptive analysis of the variables was performed. After that, the distribution of the continuous variables was used to dichotomize them.

For the **PI** the cut off point of 65% was admitted, while for the **BOP** the point established was of 25%. For **CAL** two cut off points were established in accordance with the lesser or greater severity: 3mm and 5mm, respectively. Afterwards, the percentage of individuals was calculated for each clinical periodontal parameter and the statistical significance calculated at 5%, for differences found between cases and control, by the chi-squared test. All the data analysis procedures were performed with the use of the STATA 7 statistical package.

Table 1
Some characteristics (n and %) of cases and controls included in the study.
"Hospital Maternidade Municipal de Alagoinhas, Bahia, Brazil", 2005

Variables	Case* (n=44)		Control† (n=177)		P•
	n	%	n	%	
Age (years)					
≥ 20	35	79.5	134	76.1	
< 20	9	20.5	42	23.9	0.6
Primipara					
No	24	55.8	93	54.1	
Yes	19	44.2	79	45.9	0.8
Previous History of PLBW‡					
No	31	70.5	156	88.1	
Yes	13	29.5	21	11.9	0.0
PLBW of puerperae					
No	33	76.8	141	92.7	
Yes	10	23.2	11	7.3	0.0
Tobacco consumption					
No	36	81.8	173	97.7	
Yes	8	18.2	4	2.3	0.0
Alcohol Usage					
No	35	79.5	160	90.4	
Yes	9	20.5	17	9.6	0.05
Residence					
Urban Zone	32	72.7	127	71.8	0.9
Rural Zone	12	27.3	50	28.1	
Family Income (in Minimum Wages)¶					
≥1	22	50.0	87	49.4	
>1	22	50.0	89	50.6	0.9
Educational Level (years)					
≥ 8	25	56.2	96	54.2	
>8	19	43.2	81	45.8	0.8
Race§					
Black/Mulatto	35	79.6	147	84.5	
White/Yellow	9	20.5	27	15.5	0.4
Urinary Infection					
No	30	68.2	128	72.3	
Yes	14	31.8	49	27.7	0.6
Antibiotic Usage					
No	35	79.5	36	79.2	
Yes	9	20.5	137	20.8	0.9

* Mothers of children that are born with weight of under 2.500g and gestational period below 37 weeks.
† Mothers of children that are born with weight equal to or over 2.500g and gestational period equal to or above 37 weeks.
‡ Prematurity and low birth weight
¶ One observation was lost.
§ Three observations were lost.
• P-value. Statistical significance: $P \leq 0.05$

Results

The case and control groups were comparable in regards to the following characteristics: residence, family income, educational level, primipara, urinary infection, antibiotic usage and race (Table 1). On the other hand, statistically significant differences were observed in regards to: alcohol usage, previous history of PLBW, PLBW of puerperae, and tobacco consumption.

Table 2 presents the absolute and percentage values of the puerperae, according to cases and controls, in accordance with the clinical periodontal parameters used in this study. The percentage of individuals with CAL greater than or equal to 3mm in the cases was 100%, there being no observations for the opposite condition. Among the controls, in turn, it was detected that 97.8% had CAL greater than or equal to 3mm in at least one of the sites. These differences were not significant.

When the criterion of PS assessment began to be CAL greater than or equal to 5mm, the percentage of individuals was reduced to 36.4% of the cases and 36.2%, of the controls. These differences were also not statistically significant.

Table 2
Numbers and percentages of clinical periodontal parameters in accordance with cases and controls "Hospital Maternidade Municipal de Alagoinhas, Bahia, Brazil," 2005

Clinical Parameters	Case* (n = 44)		Control† (n=177)		P‡ (X^2)
	n	%	n	%	
Clinical Attachment Loss ≥3 mm					0.3
Yes	44	100	173	97.8	
No	0	0.0	4	2.3	
Clinical Attachment Loss ≥5 mm					0.1
Yes	16	36.4	64	36.2	
No	28	63.6	113	63.8	
Plaque Index > 65%					0.1
Yes	11	25.0	41	23.2	
No	33	75.0	136	76.8	
Bleeding on Probing Index > 25%					0.2
Yes	13	29.6	60	33.9	
No	31	70.5	117	66.1	

* Mothers of children that are born with weight of under 2.500g and gestational period below 37 weeks.
† Mothers of children that are born with weight equal to or over 2.500g and gestational period equal to or above 37 weeks.
‡ P-value. Statistical significance: $P \leq 0.015$

For the PI greater than 65%, a percentage of 25% of individuals was observed among the case group whereas in the control group this percentage was 23.2%. There was also no statistically significant difference between the groups.

Considering the BOP greater than 25%, among the cases 29.6% was observed, while this finding was 33.9% in the controls. Thus, again, there was no statistically significant difference between cases and controls.

Discussion

In accordance with the main finding of this study, there was no relationship between PS, measured by means of clinical periodontal parameters, and PLBW. Although this investigation did not assess the association between the events referred to, studies found in the literature (5,6) corroborate these findings, not finding an association between periodontitis and PLBW. Nevertheless, this affirmation must be assessed with caution, since it contradicts other studies in the literature, in which periodontal disease is an important risk factor for the same gestational complications (2, 3, 4).

It is worth pointing out that the aim of the present study was to assess the relation between PS, measured by means of clinical periodontal parameters, and PLBW, without intending to test the hypothesis of possible causal association between the two clinical conditions under discussion.

The design did not include intervening factors, for example the mother's age. It is interesting to note that although the case group had signficantly more alcohol and tobacco consumption; previous history of PLBW, and the PLBW of their babies was significantly different than the control group, no difference was found in PS parameters, as these four variables all have been associated with periodontal disease in other studies. It is important to point out that there are many factors that may be related to the birth of premature and/or low birth weight babies, which were not contemplated in this study. Future research needs to address more variables in multivariate analysis.

Another aspect to consider as a limiting factor of the present study is the reduced sample size, particularly the number of cases, which may have caused distortions in the results. Although samples were selected on basis of parameters found in the literature, e.g., power to the order of 70%, the operational difficulties presented during the data collection stage diminished the precision of the findings.

The above-mentioned indexes are incapable of revealing the type of periodontopathogen that colonized the tooth surface, and whether periodontal disease is in an active or quiescent phase. In this connection, CAL is widely mentioned in the literature (2, 3, 10) as the most appropriate clinical periodontal parameter existent up to now, for establishing the diagnosis of periodontal disease. Although it was used in this study, CAL alone revealed only that in that assessed site, there was destruction of periodontal support in a period previous to the data collection. Therefore, in view of this limitation, some authors have proposed that the use of this clinical parameter should be associated with other parameters, to improve the specificity of the diagnostic criterion. (3)

In conclusion, in an attempt to obtain means based on the conjunction of various clinical periodontal parameters that may be used as possible predictors of gestational events, for example PLBW, it is suggested that future investigation be conducted to assess a possible relation between PS and PLBW, with the use of more precise methodological criteria. In this connection, it is important to consider that the combined use of the parameters referred to in the present research, would allow more accessible means of evaluating a possible relationship between this combination of parameters or prediction criterion and future gestational complications. Moreover, research with methods that assess the causality of this association are required, for example, intervention studies.

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