
Periodontal disease and its relationship with preterm labor and/or newborns with low birth weight

A doença periodontal e sua relação com o parto prematuro e/ou recém-nascidos com baixo peso ao nascer

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Abstract

Objective – To establish a relationship between the periodontal disease and premature birth babies and/or low birth weight babies, to determine that the periodontal disease may be an independent risk factor for these conditions. **Methods** – Forty-two pregnant women who attended the prenatal visits at Cruz de Malta Assistance Center (Brazil) were enrolled in this study. Each woman was submitted to a questionnaire and to a comprehensive periodontal exam. From the periodontal exam the pregnant women were assigned into two groups. **Results** – The first group was composed by periodontal disease (n=18) with an average pregnancy period of 36 weeks and newborns with weight average values of 3.210 Kg ± 0.490 Kg. The second group was composed by women without periodontal disease (n=24) who presented an average pregnancy period of 35 weeks and 5 days ± 3 days and newborns with weight average values of 2.920 Kg ± 0.510 Kg. The other risk factors cited above were also evaluated. **Conclusion** – It was possible to conclude through this present study that the periodontal disease did not interfere in a negative way neither on the pregnancy time nor on the newborn weight. Thus it cannot be classified as an independent risk factor for preterm labors and/or newborns with low birth weight babies.

Descriptors: Periodontal diseases; Obstetric labor, premature; Infant, low birth weight; Pregnant women; Risk factors

Resumo

Objetivo – Estabelecer uma relação entre a doença periodontal e bebês prematuros ao nascimento e/ou bebês de baixo peso, para determinar que a doença periodontal pode ser um fator de risco independente para essas condições. **Métodos** – Quarenta e duas mulheres grávidas que participaram das consultas pré-natais no Centro Assistencial Cruz de Malta (Brasil) foram incluídos neste estudo. Cada mulher foi submetida a um questionário e de um exame abrangente periodontal. A partir do exame periodontal as gestantes foram divididas em dois grupos. **Resultados** – O primeiro grupo foi composto por doença periodontal (n=18) com um período de gestação média de 36 semanas e recém-nascidos com peso valores médios de 3,210 kg ± 0,490 kg. O segundo grupo foi composto por mulheres sem doença periodontal (n=24), que apresentou um período de gestação média de 35 semanas e 5 dias ± 3 dias e recém-nascidos com peso valores médios de 2,920 kg ± 0,510 kg. Os outros fatores de risco citados acima também foram avaliados. **Conclusão** – Foi possível concluir através deste estudo que a doença periodontal não interferiu de forma negativa nem sobre o tempo de gravidez, nem no peso ao nascer. Assim, não pode ser classificado como um fator de risco independente para partos pré-termo e/ou recém-nascidos com baixo peso ao nascer.

Descritores: Doenças periodontais; Trabalho de parto prematuro; Recém-nascido de baixo peso; Gestantes; Fatores de risco

Introduction

Pediatric Dentistry is more and more concerned about the early diagnosis and the prevention of future problems. It is known throughout the world that the early intervention on children significantly minimizes the risk of a possible pathology or dysfunction. Thus the Pediatric Dentistry intervention is paramount from the fertilization period on. It is proved that hazardous habits such as drugs and several systemic diseases in pregnant women can directly interfere on the fetus formation and/or cause a preterm labor with low birth weight babies¹. The child's weight while being born is the most important variable for the growth, survivor and consequently the psychosocial development being more than 60% of the mortality among babies without chromosomal defects is due to the low birth weight babies². One fact that is not clearly understood is up to what point a long length low infection degree such as the periodontal disease is systemically shown and directly affects the fetus. The possible association among the periodontal disease and premature birth babies and/or low birth

weight babies should not be minimized and may be related with one of the risk factors previously associated with these occurrences.

Due to this, Offenbacher *et al.*³ (1998) conducted a case-control study with 124 pregnant women and newborn babies mothers. The participants were submitted to a medical history evaluation and to a questionnaire aiming to define the risk factors for premature birth babies and/or low birth weight babies together with a comprehensive periodontal exam. The results showed that the periodontal disease during the pregnancy may be a significant risk factor for premature birth babies and/or low birth weight babies (18.2%). This value was more significant than the pregnant women cases that were smokers or alcohol users. Dasanayake⁴ (2010) also conducted a similar case-control study with 55 mothers of low birth weight babies (<2500g) and 55 control mothers of normal birth weight babies (≥ 2500g). All the participant mothers were submitted to a questionnaire in order to determine the risk factors for premature birth and/or low birth weight babies as well as medical and periodontal

exams. The author concluded that mothers with less amount of sound sextants presented a higher low birth weight babies deliveries.

Mitchell-Lewis *et al.*² (2001) performed a two-year-study where 213 women were followed-up and clinically examined evaluating the amount of biofilm, calculus, bleeding on probing and probing depth. The pregnancy time was evaluate in 164 women including one group (n=74) that went through oral prophylaxis during the pregnancy and another group (n=90) with no prenatal periodontal treatment. The newborn low birth weight was present in 18,9% of the women who did not receive periodontal intervention during the pregnancy (17 cases) against 13.5% (10 cases) of the women who received the treatment. The authors concluded that the periodontal treatment statistically interfered on the collected results.

Davenport *et al.*⁵ (2002) opposing most of the authors proposed a case-control study with 236 cases (< 37 weeks of pregnancy and < 2499 g in weight) and a sample with 507 controls (> 38 weeks of pregnancy and > 2500 g in weight). The periodontal clinical indexes were collected in an experimental laboratory. The risk for premature birth babies and low birth weight babies decreased as the periodontal pocket depth increased. No direct evidence was found associating the periodontal disease with premature birth babies and low birth weight babies. Lopéz *et al.*⁶ (2002) evaluated 881 pregnant women with low social and economical conditions at the El Salvador hospital. A total of 639 pregnant women were selected through a medical evaluation and the study group went through a periodontal evaluation. The study showed an incidence value of 2.5% (10/406) on premature birth babies and/or low birth weight babies on women with periodontal health and 8.8% (20/233) on women with periodontitis. The authors concluded that the periodontal health is an independent risk factor for premature birth babies and low birth weight babies.

Jeffcoat *et al.*⁷ (2001) accomplished a study with 1313 pregnant women from the University of Alabama. These women went through medical and oral examinations and a prenatal exam during the 21st and 24th pregnancy weeks. The results revealed that the pregnant women with general periodontitis presented a higher risk for premature birth babies, from 4.45 to 7.07 times, when compared with the pregnant women without periodontal disease. The authors concluded that a pre-existent periodontitis on the second trimester of the pregnancy increases the risk for premature labor. Rajapakse *et al.*⁸ (2005) performed a study in Matale, rural area of Sri Lanka, with 227 pregnant women without smoking habits, alcohol ingestion and other types of drugs. The studied group was divided in exposed (n=66) and not exposed (n=161) to the periodontal disease. A total of 17 premature birth babies with low birth weight were observed being 12% in the exposed and 5.6% in the non-exposed group. The authors concluded that the results found showed a mild to moderate association between the periodontal disease and low birth weight babies.

Xiong *et al.*⁹ (2006) made a systematic bibliography evaluating 25 studies (13 case-control, 9 specific groups and 3 controlled screenings) from different countries.

Disease and an increase of the risk for pregnancy problems and 7 did not find any evidence for this association. The 3 clinical screening studies suggested that the oral prophylaxis and the periodontal treatment may lead to a reduction of 57% on the risk for the premature newborn with low weight and a reduction of 50% on the risk for premature labors. The authors concluded that the periodontal disease may be associated with a risk increase for pregnancy problems. On the other hand, further studies with a more rigorous methodology are necessary. The authors also observed that the social-economical factor plays an important role and interfere on the final results.

Once the chemical mediators which participate on the inflammatory and immunological response and the periodontal pathogens may be present not only locally but also systemically the possible relationship between periodontal disease and systemic conditions as the premature birth babies and/or low birth weight babies may be considered and studied. Thus the purposes of this present study were to establish a relationship between the periodontal disease and premature birth babies and/or low birth weight babies, to determine that the periodontal disease may be an independent risk factor for these conditions and prove that the smoking habit as well as the coffee consumption, the diet and prenatal care may be risk factors for premature birth and/or low birth weight babies.

Methods

Sixty-three pregnant women, regardless the age and pregnancy stage were conducted and examined at the Cruz de Malta Assistance Center. Only one person applied the questionnaire and the periodontal exam. This study was submitted and approved by the Ethical Committee at Cruzeiro do Sul University (protocol nº 055/05, 11/17/05). A scaled periodontal probe, a clinical mirror and a periodontal chart were used for the periodontal exam. This exam consisted on the periodontal probing of the lower incisors and upper first molars with a scaled periodontal probe. The probing was performed in 6 spots on each tooth: 3 spots on the buccal surface and 3 spots on the lingual surface. The oral hygiene, gingival inflammation, probing depth and clinical insertion level were analyzed on the evaluated teeth. The oral hygiene condition was clinically determined by the visible biofilm gathering⁸. The gingival inflammation was evaluated through the presence or absence of bleeding on probing⁸. The probing depth was determined by the distance in millimeters from the gingival margin to the periodontal pocket bottom or gingival sulcus. The clinical insertion level was evaluated with a periodontal probe in millimeters being expressed as the distance of the cement-enamel junction to the bottom of the pocket or gingival sulcus². The presence of 3 or more teeth with one or more spots with 4 or more millimeters of probing depth accompanied by bleeding on probing was considered

Chart 1. Risk factors that may induce to premature birth and/or low birth weight babies obtained through a questionnaire

Demographic factors	Age	The age range from 20 to 25 is the most incidence for premature birth and/or low birth weight babies ⁷
	Weighth	Anemia and malnutrition increase the risk for premature birth and/or low birth weight babies ¹³
	Etnia	The black race presents a higher incidence for premature birth and/or low birth weight babies ⁷
Life habits	Smoking habits	Smoking more than 5 cigarettes a day increases the premature birth and/or low birth weight babies ¹²
	Alcohol	Consume more than 3 drinks a week increases the risk for premature birth and/or low birth weight babies ¹¹
	Drugs	The use of illegal drugs increases the risk for premature birth and/or low birth weight babies ¹²
	Coffee	Consume more than 3 cups of coffee a day increases the risk for premature birth and/or low birth weight babies ¹⁷
	Sexual activity	Not having one steady partner increases the risk for premature birth and/or low birth weight babies ¹¹
Social-economical factors	Social problems	Social discrimination may lead to an extreme emotional stress increasing the risk for premature birth and/or low birth weight babies ²
		Single mothers may have doubled responsibilities. It may take to a physical and emotional stress increasing the risk for premature birth and/or low birth weight babies ¹
	Economic problems	A bad diet may promote a malnutrition and anemia increasing the risk for premature birth and/or low birth weight babies ¹³
		The lower the economic status the less the information access to the prenatal care ²

as periodontal disease. All these information was input in the periodontal chart.

One questionnaire was applied in order to determine the possible risk and/or possibility for a premature birth and/or low birth weight newborns through the evaluation of the factors on Chart 1. The obtained information from the questionnaire and from the medical chart was filed^{1,8,10-13}. The following factors were defined for this study through a quantitative analysis from each risk factor, as cited: 1. Smoking habit: risk factor when the consumption was more than 5 cigarettes a day¹⁴ (smokers (n=12) and non-smokers (n=31); 2. Coffee: risk factor when the consumption was more than 3 cups a day³ (coffee drinker (n=8) and not coffee drinker (n=35); 3. Diet: the more qualitative and quantitative the higher the risk for pregnancy problems⁸ (up to 3 meals a day (n=19) and more than 3 meals a day (n=24).

The information collected from the periodontal chart were interpreted and based on the criteria described above the pregnant women were divided in two groups. The first group was composed by pregnant women without periodontal disease (n=24) and the second group was composed by pregnant women with periodontal disease (n=18).

The data were collected and statistically analyzed and from the obtained results the pregnancy time and the newborn babies were classified according to the World Health Organization¹ (WHO): newborns with normal weight: >3000g; newborns with insufficient weight: <3000g/2500g; low weight at the birth: <2500g/1500g; low weight: <1500g/>100g; extremely low weight:

<1000g / >750g; immature newborns: <750g; normal birth: > 37 pregnancy weeks; premature birth: < 37 pregnancy weeks.

The statistical analysis was made through the arithmetic average values from the collected data both for the pregnancy time (weeks/days) and for the newborn weight (Kg) from the pregnant women from each studied group as well as the standard deviation values. The statistical analysis applied was the Mann Whitney test.

Results

A total of 43 pregnant women out of the 63 who started the study concluded this research. Due to problems on the data collection twenty pregnant women were eliminated from the study. Among the 43 evaluated pregnant women one of them went through a spontaneous abortion. Among all the pregnant women evaluated and observed: 16.66% (7) had a premature birth; 83.34% (35) had a normal birth; 28.57% (12) with insufficient weight; 16.66% with low weight and 54.66% with normal weight.

The Table 1 shows the statistical results having the periodontal disease as the basis and as a possible risk factor for premature birth and/or low birth attention: weight babies; the smoking habit as a basis and as a possible risk factor for premature birth and/or low birth weight babies; the coffee consumption as a basis and as a possible risk factor for premature birth and/or low birth weight babies; and the diet as a basis and as a possible risk factor for premature birth and/or low birth weight babies.

Table 1. Correlation between possible risk factors and premature birth and/or low birth weight babies

Risk factors	n	Delivery (week/days)	Weight (Kg)
Periodontal disease			
Yes		36 weeks ± 2 days	3.210 ± 0.490
No	18	35 weeks and 5 days ± 3 days	2.920 ± 0.510
p value	24	0.9190	0.1038
Smoking habit			
Yes		36 weeks and + 2 days	3.070 ± 0.520
No	30	35 weeks and 5 days ± 3 days	2.990 ± 0.560
p value	12	0.9223	0.5040
Coffee consumption			
Yes		36 weeks and 2 days ± 2 days	3.280 ± 0.650
No	8	35 weeks and 5 days ± 3 days	34 2.990 ± 0.480
p value	34	0.6538	0.2115
Diet			
Up to 3 meals a day		35 weeks and 2 days ± 3 days	2.980 ± 0.5402
More than 3 meals a day	18	36 weeks and 2 days ± 2 days	3.100 ± 0.520
p value	24	0.0770	0.4680

Discussion

The prevention of possible systemic diseases and the detection of factors that can cause a pathology or abnormality are fundamental for the health professional. The already known association between oral infections and infectious spots in other body sites¹⁵ makes the pediatric professional a direct responsible on the pregnant oral health aiming for a normal pregnancy and without risks for the fetus. The scientific proof that products and specific periodontal microorganisms reach significant levels on the blood stream during the disease evolution^{12-13,16-17} and even be present on the amniotic liquid¹⁶ makes the periodontal disease on the pregnancy a relevant pathological condition to be studied both on the disease action mechanism and on its systemic reflexes.

A total of 18 pregnant women presented periodontal disease and 24 presented a healthy condition out of 42 pregnant women evaluated in this present study. The pregnant women with periodontal disease presented an average pregnancy period of 36 weeks ± 2 days and newborns with an average weight of 3.210 Kg ± 0.490 Kg. The healthy pregnant women presented an average pregnancy time of 35 weeks and 5 days ± 3 days and newborns with an average weight of 2920 Kg ± 0.510 Kg. The pregnant women with periodontitis and healthy presented a practically equivalent normal pregnancy time. Comparing the results from this present study with the findings from López *et al.*⁶ (2002) it is possible to evaluate a different trend on the results. From all the 188 pregnant women evaluated by López *et al.*¹⁴ (2002) 177 had a normal pregnancy time and 11 had a premature labor. Regarding the periodontal condition, 163 had the absence of periodontitis, 161 had a normal pregnancy time and 2 had a premature labor. Davenport *et al.*¹⁸ (1998) concluded that the premature labor risk decreased with the increase of the periodontal pocket depth. Regarding the newborn weight the pregnant women with periodontal disease had children with average values higher than the healthy ones. From the results analysis it is possible to affirm that the periodontal disease had no negative interference on the newborns weight. It is important to highlight

that both average values are not classified as being low birth weight babies according to the WHO. López *et al.*¹⁴ (2002) noted that the average weight values from children with mothers who had periodontal disease was 3297g ± 502g while children from healthy mothers presented an average weight value of 3364g ± 468g. Rajapakse *et al.*⁸ (2005) conducted a study with pregnant free from other risk factors for premature birth and/or low birth weight babies already known (tobacco, coffee, alcohol) and observed a great similarity on the results comparing the pregnant with periodontal disease (2747g ± 544g / 39.3 weeks ± 2.4 weeks) and health ones (2763g ± 478g / 39.6 weeks ± 1.9 weeks). The values below the average found by Rajapakse *et al.*⁸ (2005) may be explained by the study group inclusion criteria: 227 pregnant from Matala, rural area of Sri Lanca. According with Xiong *et al.*⁹ (2006) the social-economical condition directly interferes on the results observed in the studies. Brazilian pregnant with low social-economical conditions composed the selected group for this study. Depending on the social-economical situation from the studied group it is possible for other risk factors for premature birth and/or low birth weight babies to interfere more significantly on the pregnant women (diet, schooling, prenatal care). The smoking habits, coffee intake, diet and the initial prenatal care were also evaluated as risk factors for premature birth and/or low birth weight babies.

The pregnant women who had more than 5 cigarettes a day and/or lived daily with smokers at the same environment (passive smokers) were classified as smokers (n=12) and the others were classified as non-smokers (n=30). The smokers presented an average pregnancy period of 35 weeks and 5 days ± 3 days and newborns with average weight of 2990 Kg ± 0.560 Kg. The non-smokers presented an average pregnancy period of 35 weeks and 6 days ± 2 days and newborns with average weight of 3.070 Kg ± 0.520 Kg. It was not possible to detect the relevant difference among the average values of the pregnancy period. The newborns average weight from smokers was lower when compared with the non-smokers. From the data analysis obtained through the arithmetic average

it was possible to affirm that the cigarette use interfered negatively on the newborn weight values. Offenbacher *et al.*³ (1998) noted that he pregnant women who smoked more than one pack of cigarettes a day during the pregnancy presented a higher incidence of premature birth (4%) when compared with the non-smokers (0%).

The coffee consumption was evaluated dividing the pregnant women in two groups. The first group composed by pregnant women who consumed more than 3 cups of coffee a day (n=8) and the second group composed by pregnant women who did not consume coffee during the pregnancy (n=34). Parazzini *et al.*¹⁹ (2005) affirmed that the coffee intake during the pregnancy interfere negatively on the pregnancy period although not being significant when compared to the tobacco. The first group presented an average pregnancy period of 36 weeks and 2 days \pm 2 days and newborns average weight values of 3.280 Kg \pm 0.650 Kg. The second group presented an average pregnancy period of 35 weeks and 5 days \pm 3 days and newborns average weight values of 2.990 Kg \pm 0.480 Kg. It is possible to affirm that the coffee intake did not interfere in a negative way on the pregnancy period and on the newborn weight. Dasanayake *et al.*⁴ (2010) noted that among the pregnant women with low weight newborns (<2500 g) 11% were coffee users while that among the pregnant women with normal newborns (\geq 2500 g) 16% were coffee users. The authors concluded that the coffee intake did not interfere in a negative way on the newborn weight.

In order to evaluate the amount of food ingested by each pregnant the number of meals per day was used as a parameter. Villamor *et al.*¹⁰ (2004) affirmed that the higher the malnutrition degree the higher the risk for premature birth and/or low birth weight babies. The pregnant women were divided in two groups. The first group was composed by pregnant women who had up to 3 meals a day (n=19) and the second group by pregnant women who had more than 3 meals a day (n=24). The first group presented an average pregnancy period of 35 weeks and 2 days \pm 3 days and newborns average weight of 2.980 Kg \pm 0.540 Kg. The second group presented an average pregnancy period of 36 weeks and 2 days \pm 2 days and newborns average weight of 3.100 Kg \pm 0.520 Kg. It was possible to note a one-week-discrepancy between the groups on the pregnancy period and a higher average in weight on the second group. Thus it was possible to affirm that the pregnant women who had fewer meals a day went through a negative interference on the pregnancy period and on the newborns weight. Rajapakse *et al.*⁸ (2005) agreed with this tendency once the pregnant women with periodontal disease (n=66) had an average weight value of 53.4 Kg \pm 8.5 Kg while the healthy ones (n=161) had an average weight value of 56.6 Kg \pm 5.2 Kg (p=0.01). López *et al.*⁶ (2002) reaffirmed this tendency stating that 6 (15%) out of 40 pregnant women evaluated in the study, who had a low weight gain during the pregnancy period, presented a premature birth and/or low birth weight babies.

Studies like this one are paramount for dental professionals in order to evaluate the possible interferences and project the adequate precautions to assure to the

pregnant women a safe and sound pregnancy period minimizing the health risks enabling thus a normal and healthy development for the fetus. The pediatric dentist should not underestimate such biological effects having the direct responsibility to detect, alert and intercede on the oral manifestations and habits which may address as probable risk factors for premature birth and/or low birth weight babies.

Conclusion

It was possible to conclude through this present study that the periodontal disease did not interfere in a negative way neither on the pregnancy time nor on the newborn weight. Thus it cannot be classified as an independent risk factor for preterm labors and/or newborns with low birth weight babies. The other factors (smoking habit, coffee intake, diet and prenatal care) analyzed and discussed did not present statistical significance to be labeled as independent risk factors for premature birth and/or low birth weight babies. Multiple and independent studies are necessary to prove or not the relationship between the periodontal disease and premature birth and/or low birth weight babies.

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