

Periodontal Condition in High-Risk Pregnant Women

Condição Periodontal em Gestantes de Alto Risco

Condición Periodontal en Mujeres Embarazadas de Alto Riesgo

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Abstract

Introduction: Oral health is related to the systemic health of the pregnant woman and the fetus, highlighting the importance of the oral health approach as a gestational health problem. **Objective:** To verify the prevalence of periodontal pocket and to analyze the relationship of the condition with sociodemographic factors, medical history, and behavioral profile in high-risk pregnant women. **Methods:** This cross-sectional, observational and analytical study comprised 800 high-risk pregnant women. Interviews were performed using a structured questionnaire to obtain data on sociodemographic characteristics, medical history and behavioral factors and the periodontal examination was carried out using the Community Periodontal Index (CPI). Statistical analyzes were performed to estimate odds ratio (OR) and 95% confidence interval (CI) between periodontal pocket and variables age group, living area, skin color, housing, marital status, schooling, family income, gestational period, number of children, arterial hypertension, gestational arterial hypertension, diabetes mellitus, gestational diabetes mellitus, smoking habit and alcoholism. **Results:** Of the total of 800 pregnant women examined, it was observed that 216 (27%) showed periodontal pocket. The condition was associated with age group (35-45 years: OR=2.498; CI=1.297-4.813; p-value=0.006), schooling (≤ 7 years: OR=1.638; CI=1.017-2.638; p-value=0.042), family income (\leq USD\$ 400.00: OR=1.431; CI=1.004-2.041; p-value= 0.048), diabetes (OR=2.508; CI=1.511-4.163; p-value=0.000) and smoking habit (OR=2.211; CI=1.460-3.348; p-value=0.000). **Conclusions:** The prevalence of periodontal pocket was high and the factors age, low schooling, low family income, diabetes and smoking habit are related to greater chances of occurrence in high-risk pregnant women.

Descriptors: Pregnancy, High-Risk; Periodontitis; Epidemiology.

Resumo

Introdução: A saúde bucal está relacionada à saúde sistêmica da gestante e do feto, ressaltando a importância da abordagem da saúde bucal como um problema de saúde gestacional. **Objetivo:** Verificar a prevalência de bolsa periodontal e analisar a relação da condição com fatores sociodemográficos, história médica e perfil comportamental em gestantes de alto risco. **Métodos:** Estudo transversal, observacional e analítico com 800 gestantes de alto risco. As entrevistas foram realizadas por meio de questionário estruturado para obtenção de dados sobre características sociodemográficas, histórico médico e fatores comportamentais, e o exame periodontal por meio do Índice Periodontal Comunitário (IPC). Estimou-se o odds ratio (OR) e o intervalo de confiança de 95% (IC) para a relação entre bolsa periodontal e as variáveis faixa etária, tipo e área de moradia, cor da pele, estado civil, escolaridade, renda familiar, período gestacional, número de filhos, hipertensão arterial, hipertensão arterial gestacional, diabetes mellitus, diabetes mellitus gestacional, tabagismo e etilismo. **Resultados:** Do total de 800 gestantes examinadas, observou-se que 216 (27%) apresentavam bolsa periodontal. A condição esteve associada à faixa etária (35-45 anos: OR=2,498; IC=1,297-4,813; p-valor=0,006), escolaridade (≤ 7 anos: OR=1,638; IC=1,017-2,638; p-valor=0,042), renda familiar (\leq USD\$400,00: OR=1,431; IC=1,004-2,041; p-valor=0,048), diabetes (OR=2,508; IC=1,511-4,163; p-valor=0,000) e tabagismo (OR=2,211; IC=1,460-3,348; p-valor=0,000). **Conclusões:** A prevalência de bolsa periodontal foi elevada e os fatores idade, baixa escolaridade, baixa renda familiar, diabetes e tabagismo estão relacionados a maiores chances de ocorrência em gestantes de alto risco.

Descritores: Gravidez de Alto Risco; Periodontite; Epidemiologia.

Resumen

Introducción: La salud bucal se relaciona con la salud sistémica de la gestante y del feto, enfatizando la importancia del abordaje de la salud bucal como problema de salud gestacional. **Objetivo:** Verificar la prevalencia de bolsa periodontal y analizar la relación de la condición con factores sociodemográficos, antecedentes médicos y perfil conductual en gestantes de alto riesgo. **Métodos:** Estudio transversal, observacional y analítico con 800 gestantes de alto riesgo. Las entrevistas se realizaron mediante un cuestionario estructurado para obtener datos sobre características sociodemográficas, antecedentes médicos y factores conductuales, y el examen periodontal mediante el Índice Periodontal Comunitario (IPC). Se estimó la odds ratio (OR) y el intervalo de confianza (IC) del 95% para la relación entre la bolsa periodontal y las variables grupo de edad, tipo y área de residencia, color de piel, estado civil, educación, ingresos familiares, período gestacional, número de hijos, hipertensión arterial, hipertensión arterial gestacional, diabetes mellitus, diabetes mellitus gestacional, tabaquismo y consumo de alcohol. **Resultados:** Del total de 800 gestantes examinadas, se observó que 216 (27%) presentaban bolsa periodontal. La condición se asoció con la edad (35-45 años: OR=2,488; IC=1,297-4,813 p=0,006), educación (≤ 7 años: OR=1,638; IC=1,017-2,638; p=0,042), ingresos familiares (\leq USD\$ 400,00: OR=1,431; IC=1,004-2,041; p=0,048), diabetes (OR=2,508; IC=1,511-4,163; p=0,000) y tabaquismo (OR=2,211; IC=1,460-3,348; p=0,000). **Conclusiones:** La prevalencia de bolsa periodontal fue alta y los factores edad, baja escolaridad, bajos ingresos familiares, diabetes y tabaquismo se relacionan con mayores probabilidades de ocurrencia en gestantes de alto riesgo.

Descritores: Embarazo de Alto Riesgo; Periodontitis; Epidemiología.

INTRODUCTION

The prevention of oral diseases during pregnancy has been receiving special attention from policy makers and health institutions who care for pregnant women and babies¹. The

World Health Organization (WHO) recognizes that oral health is related to the systemic health of the pregnant woman and the fetus, highlighting the importance of the oral health

approach as a gestational health problem².

Studies suggest that the women may be more susceptible to the development of periodontal diseases during pregnancy^{3,4}. A systematic review found that an increase in gingival inflammation during pregnancy can occur even without a significant increase in dental plaque levels⁵. This may be related to the hormonal variations present in pregnancy, since high plasma concentrations of estrogen and progesterone can contribute to trigger or exacerbate preexisting gingival inflammation⁶.

Periodontal bacterial infection and the cascade of events resulting from the action of immuno-inflammatory mediators may be involved in the adverse outcome of pregnancy⁷⁻⁹. A systematic review showed that there is consistent evidence that pregnant women with periodontitis are more likely to develop pre-eclampsia and have a premature baby with low birth weight, highlighting periodontal diseases as a relevant risk factor for several adverse pregnancy outcomes¹⁰. The relationship of sociodemographic profile with periodontal condition during pregnancy was also investigated. The low socioeconomic level has been related to increased bleeding index scores and probing depth in pregnant women¹¹.

However, some gaps persist in the relationship between sociodemographic conditions, such as income inequality, and oral health status, so that low income is less likely to affect all oral health outcomes to the same degree¹².

Although knowledge about complications associated to periodontal diseases in pregnant women has been the focus of the study in several studies, there are still few studies conducted in high risk pregnant women. Gestational risk factors are characteristics, situations or pathologies that lead to a higher probability of complications and, consequently, a greater risk of the woman and/or the fetus to evolve to death. In Brazil, approximately 15% of pregnancies are characterized as high-risk pregnancy, and the diagnoses of gestational diabetes and arterial hypertension are the most frequent causes of this condition¹³. Considering that oral health cannot be dissociated from systemic health, and that high-risk pregnant women represent a group of higher vulnerability to the development of health complications, this study aimed to investigate the prevalence of periodontal pockets in high-risk pregnant women and to analyze the relationship with sociodemographic factors, medical history, and behavioral profile.

MATERIAL AND METHOD

This is an observational cross-sectional study performed with high-risk pregnant women from a Brazilian referral center for specialized health care in 2018. The study was approved by Research Ethics Committee on Human Beings (Process Number: 60855316.8.0000.5420) and performed in accordance with the ethical standards as laid down in the 2008 Declaration of Helsinki. Informed consent was signed by all individuals who participated in the study. The study included all high-risk pregnant women who agreed to participate in the survey, regardless of gestational period, skin color and age. Patients with conditions that prevented oral clinical examination were excluded. The classification as high-risk pregnant woman was based on the protocol of the Brazilian Ministry of Health, which evaluates individual characteristics and unfavorable sociodemographic conditions, reproductive history prior the current gestation, presence of chronic morbidities and obstetric illness in the current pregnancy¹³. The sample size was calculated considering a prevalence of 50%, a margin of error of 5% and a confidence level of 95%, resulting in a minimum sample of 322 high-risk pregnant women.

Previously, a pilot study was conducted with 160 pregnant women not included in the research to make adjustments to the collection instrument and to guarantee the reliability of the data obtained.

The following data were obtained by using a structured questionnaire: age, living area, skin color, marital status, schooling, family income, gestational period, number of children, medical history, diabetes, hypertension, smoking and alcoholism and reason for high-risk pregnancy. The periodontal condition was evaluated by means of the Community Periodontal Index using a flat mouth mirror and millimeter periodontal probe, according to World Health Organization guidelines¹⁴. In this study, Community Periodontal Index scores 3 and 4 were considered as presence of periodontal pocket. Two examiners were trained and calibrated prior the periodontal condition examination. The intra-examiner and inter-examiner kappa concordance were 0.90 and 0.80, respectively.

Absolute and percentage frequency distributions were used to present the results. Chi-square test was performed to verify the association between periodontal pocket and variables age group, living area, skin color, housing, marital status, schooling, family income, gestational period, number of children,

arterial hypertension, gestational arterial hypertension, diabetes mellitus, gestational diabetes mellitus, smoking habit and alcoholism.

The multivariate analysis was performed only with the variables that showed $p < 0.10$ in the univariate analysis. The relationship of the sociodemographic factors, medical history, and behavioral profile in high-risk pregnant women and periodontal pocket development was evaluated by using multivariate logistic regression analysis to estimate odds ratio (OR) and 95% confidence interval (CI). The significance level adopted was 5%. Statistical analysis was performed using software SPSS Statistics.

RESULTS

Eight hundred patients accepted to participate in the study. The prevalence of periodontal pocket was 27% ($n=216$). Table 1 shows data about the sociodemographic factors, medical history, and behavioral profile of the high-risk pregnant women.

Table 1. Presence of periodontal pocket according to sociodemographic characteristics, medical history and behavioral factors of high-risk pregnant women. Araçatuba, Brazil, 2018.

Variables	Periodontal pocket		Total			
	No		Yes			
	n	%	n	%	n	%
Age group						
13 - 19 years	122	20.89	27	12.50	149	18.63
20 - 34 years	358	61.30	129	59.72	487	60.88
35 - 45 years	104	17.81	60	27.78	164	20.50
Living area						
Rural	17	2.91	9	4.17	26	3.25
Urban	567	97.09	207	95.83	774	96.75
Skin color						
White	286	48.97	95	43.98	381	47.63
Non-white	298	51.03	121	56.02	419	52.38
Housing						
Own	207	35.45	72	33.33	279	34.88
Not own	377	64.55	144	66.67	521	65.13
Marital status						
Single/Divorced /Widowed	160	27.40	42	19.44	202	25.25
Married	424	72.60	174	80.56	598	74.75
Schooling						
≤ 7 years	106	18.15	56	25.93	162	20.25
8 - 10 years	185	31.68	70	32.41	255	31.88
≥ 11 years	293	50.17	90	41.67	383	47.88
Monthly family income						
≤ USD\$ 400.00	249	45.52	114	54.29	363	47.95
≥ USD\$ 400.00	298	54.48	96	45.71	394	52.05
Gestational period						
First Trimester	100	17.12	27	12.50	127	15.88
Second Trimester	277	47.43	106	49.07	383	47.88
Third Trimester	207	35.45	83	38.43	290	36.25
Number of children						
No children	241	41.27	70	32.41	311	38.88
One child	199	34.08	64	29.63	263	32.88
Two children	79	13.53	46	21.30	125	15.63
Three or more children	65	11.13	36	16.67	101	12.63
Arterial hypertension						
Yes	145	24.83	65	30.09	210	26.25
Not	439	75.17	151	69.91	590	73.75
Gestational arterial hypertension						
Yes	76	12.91	32	14.81	108	13.50
Not	69	11.51	33	15.19	102	12.75
Diabetes Mellitus						
Yes	42	7.19	36	16.67	78	9.75
Not	542	92.81	180	83.33	722	90.25
Gestational Diabetes Mellitus						
Yes	19	3.24	17	7.72	36	4.50
Not	23	3.87	19	8.78	42	5.25
Smoking						
Yes	77	13.18	58	26.85	135	16.88
Not	507	86.82	158	73.15	665	83.13
Alcoholism						
Yes	34	5.82	21	9.72	55	6.88
Not	550	94.18	195	90.28	745	93.13
Reasons for High Risk Pregnancy						
Personal characteristics	127	21.75	39	18.06	166	20.75
Obstetric history	54	9.25	15	6.94	69	8.63
Chronic morbidities	217	37.16	100	46.30	317	39.63
Current obstetric changes	186	31.85	62	28.70	248	31.00

The mean age of the patients was 27.4 years, and the majority were in the 20 to 34 age group. More than 95% of the pregnant women lived in urban areas and approximately half of them were non-white. About one-fifth of the participants had up to 7 years of schooling and approximately half of them had a monthly family income of less than USD\$ 400.00 and was in the second trimester of the pregnancy. More than a quarter of the patients had hypertension and about 10% had diabetes mellitus. Smoking and alcoholism were observed in 17% and 7% of pregnant women, respectively. More than a quarter of patients had more than one child and the main reasons for high-risk pregnancy were chronic morbidities and current obstetric changes. The univariate logistic regression analysis showed that the variables age group ($p = 0.001$), marital status ($p = 0.022$), schooling ($p = 0.030$), family income ($p = 0.031$), number of children ($p = 0.003$), diabetes mellitus ($p = 0.000$) and smoking ($p=0.000$) were associated with periodontal pocket (Table 2).

Table 2. Univariate logistic regression analysis for periodontal pocket in high-risk pregnant women. Araçatuba, Brazil, 2018.

Variables	Univariate Analysis		
	p-Value	Odds Ratio	95% Confidence Interval
Age group	0.001		
13 - 19 years	-	-	-
20 - 34 years	0.039	1.628	1.025-2.587
35 - 45 years	0.000	2.607	1.543-4.403
Living area			
Rural	0.376	1.450	0.636-3.304
Urban	-	-	-
Skin color			
White	-	-	-
Non-white	0.210	1.222	0.893-1.673
Housing			
Own	-	-	-
Not own	0.578	1.098	0.790-1.527
Marital status			
Single/Divorced /Widowed			
Married	0.022	1.563	1.066-2.293
Schooling	0.030		
≤ 7 years	0.008	1.720	1.152-2.568
8 - 10 years	0.260	1.232	0.857-1.770
≥ 11 years	-	-	-
Monthly family income			
≤ USD\$ 400.00	0.031	1.421	1.033-1.956
≥ USD\$ 400.00	-	-	-
Gestational period	0.276		
First Trimester	-	-	-
Second Trimester	0.155	1.417	0.877-2.291
Third Trimester	0.118	1.485	0.905-2.437
Number of children	0.003		
No children	-	-	-
One child	0.606	1.107	0.752-1.631
Two children	0.002	2.005	1.278-3.146
Three or more children	0.009	1.907	1.172-3.101
Arterial hypertension			
Yes	0.134	1.303	0.922-1.842
Not	-	-	-
Gestational arterial hypertension			
Yes	0.670	0.880	0.490-1.581
Not	-	-	-
Diabetes Mellitus			
Yes	0.000	2.581	1.603-4.154
Not	-	-	-
Gestational Diabetes Mellitus			
Yes	0.861	1.083	0.443-2.645
Not	-	-	-
Smoking			
Yes	0.000	2.417	1.645-3.551
Not	-	-	-
Alcoholism			
Yes	0.055	1.742	0.987-3.074
Not	-	-	-
Reasons for High Risk Pregnancy	0.122		
Personal characteristics	-	-	-
Obstetric history	0.771	0.905	0.460-1.777
Chronic morbidities	0.064	1.501	0.976-2.307
Current obstetric changes	0.727	1.085	0.685-1.719

The multivariate logistic regression analysis showed that the variables age group (OR = 2.498, 95% CI = 1.297-4.813, p = 0.006), schooling (OR = 1.638, 95% CI = 1.017-2.638, p = 0.042), family income (OR = 1.431, 95% CI = 1.004-2.041, p = 0.048), diabetes mellitus (OR = 2.508, 95% CI = 1.511-4.163, p = 0.000) and smoking (OR = 2.211, 95% CI = 1.460-3.348 ; p = 0.000) remained significantly associated with periodontal pocket (Table 3).

Table 3. Multivariate logistic regression analysis for periodontal pocket in high-risk pregnant women. Araçatuba, Brazil, 2018.

Variables	Multivariate Analysis		
	p-Value	Odds Ratio	95% Confidence Interval
Age group			
13 - 19 years	-	-	-
20 - 34 years	0.091	1.625	0.925-2.852
35 - 45 years	0.006	2.498	1.297-4.813
Marital status			
Single/Divorced /Widowed			
Married	0.174	1.343	0.878-2.054
Schooling			
≤ 7 years	0.042	1.638	1.017-2.638
8 - 10 years	0.097	1.423	0.939-2.156
≥ 11 years	-	-	-
Monthly family income			
≤ USD\$ 400.00	0.048	1.431	1.004-2.041
≥ USD\$ 400.00	-	-	-
Number of children			
No children	-	-	-
One child	0.280	0.786	0.509-1.216
Two children	0.808	1.068	0.629-1.815
Three or more children	0.321	0.737	0.403-1.347
Diabetes Mellitus			
Yes	0.000	2.508	1.511-4.163
Not	-	-	-
Smoking			
Yes	0.000	2.211	1.460-3.348
Not	-	-	-

DISCUSSION

Periodontal pocket was observed in more than a quarter of the high-risk pregnant women and its occurrence was associated with advanced age, low schooling, low family income, diabetes and smoking.

Periodontal tissue changes may be influenced by the immunological status and hormonal variations of the pregnant woman.⁶ Additionally, gestational development under conditions of stress and anxiety may lead the pregnant woman to neglect her oral hygiene, contributing to the deterioration of the periodontal condition. However, it should be emphasized that pregnancy itself is not a risk factor for periodontal diseases, so maintaining adequate levels of oral hygiene during gestation is essential for the prevention of periodontitis¹⁵.

Periodontal diseases can negatively affect the quality of life of individuals, involving aspects such as pain and functional and aesthetic impairment^{16,17}. This relationship becomes even more relevant when considering the situation of greater vulnerability and health risk in the high-risk pregnant woman.

Our results are in accordance to scientific evidence showing that the occurrence and severity of periodontal diseases increases with age^{18,19}. A systematic review has shown that a strong increase in the prevalence of periodontal

disease has been observed in individuals between 30 and 40 years of age, stabilizing at advanced age¹⁹. The influence of age on the occurrence of periodontal disease can be understood by successive exposure to proinflammatory conditions throughout life, dysregulation of the immune system and alterations in the ability of cells and tissues to heal¹⁸.

In this study, the low family income and low schooling were significantly associated with the presence of periodontal pocket. Our findings are in agreement with studies that observed association between low individual/family income and adverse oral health outcomes, including a positive association between income inequality and periodontal diseases^{12,20}. A study performed to evaluate the periodontal condition of 130 pregnant women verified that gingivitis due to plaque accumulation was the most frequent periodontal condition and was significantly related to professional level, schooling and previous periodontal maintenance, highlighting the importance of adopting periodontal preventive measures for pregnant women²¹. Pregnant women with higher education level are more likely to have an adequate level of knowledge about oral health, however, there is a need to reinforce some aspects related to oral hygiene, especially preventive methods and myths about dental treatment during pregnancy²². Taken together, the data suggest that the development of oral health promotion strategies and actions during prenatal care should consider the sociodemographic aspects of pregnant women.

The data revealed a significant association between smoking and periodontal pocket in the high-risk pregnant women. Comparing the results of a recent systematic review, it is noted that the prevalence of smoking observed in the present study (17%) is above the overall prevalence of smoking during pregnancy. Estimates indicate that the prevalence of smoking in pregnant women is 8.1% in Europe, 5.9% in America, 1.2% in Southeast Asia, 1.2% in the Western Pacific, 0.9% in the Eastern Mediterranean and 0.8% in Africa²³. Evidence has shown that smokers have greater susceptibility, severity and rate of progression of periodontal diseases compared to nonsmokers. In addition, smokers have greater tooth loss and have a less favorable response to periodontal therapy than nonsmokers²⁴. This may be related to the fact that smoking reduces the effectiveness of the immune response against periodontal pathogens in patients with periodontitis²⁵.

Moreover, a study showed that smokers had a subgingival microbial profile with high pathogen diversity and poor in commensals, suggesting that smoking may develop a risky environment for the development of periodontal diseases²⁶.

It was observed a significant association between diabetes mellitus and periodontal pocket. The relationship between systemic diseases and hormonal alterations, especially diabetes, has been reported as an important factor in the development of periodontal disease during pregnancy^{27,28}. There is a bidirectional relationship between diabetes mellitus and periodontal diseases, so that diabetes increases the risk and severity of periodontitis while it can worsen insulin sensitivity and impair glycemic control^{29,30}. The mechanisms involved in the relationship between these two diseases are not completely elucidated, but it is suggested that aspects of the immune system, neutrophil activity and inflammatory cytokines are involved³¹.

Study showed that periodontal therapy can improve glycemic control in type 2 diabetics, emphasizing that periodontal health control is not only important for oral health, but also for systemic health³². Additionally, evidence suggest the consequences of diabetes during pregnancy involve increased rates of congenital malformations and perinatal mortality, representing important implications for public health³³.

The study design can be considered a limitation of the present research, since in a cross-sectional study the exposure factors and the results are evaluated concomitantly and, therefore, it is not possible to establish a temporal sequence between the exposure and the result.

Lack of oral health care during gestation may have negative outcomes for high-risk pregnant women, as suggested by studies that indicate an association between poor oral health status and poorer quality of life during pregnancy³⁴. Strategies and actions aimed at maintaining the oral health of high-risk pregnant women should be developed and prioritized, especially for low-income populations.

CONCLUSION

The prevalence of periodontal pocket was high and the factors age, low schooling, low family income, diabetes and smoking habit are related to greater chances of occurrence of the disease in high-risk pregnant women. It is essential to ensure the prevention, promotion and recovery of the oral health of pregnant women during prenatal care, especially in high-

risk pregnancies, in order to minimize undesirable perinatal results and improve the quality of life and well-being of the pregnant woman and the child.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interests.

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