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Oral Health Behaviors and Dental Treatment During Pregnancy: A Cross-Sectional Study Nested in a Cohort in Northeast Brazil

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ABSTRACT

Objective: To evaluate changes in oral health behavior and the use of dental health services during pregnancy. **Material and Methods:** This is a cross-sectional study nested in a prospective cohort of pregnant women in the city of São Luís, MA. A total of 262 women receiving prenatal care at the Mother-Infant University Hospital were interviewed, through a semi-structured questionnaire, regarding their use of dental services, type of dental treatment received, dietary habits, and oral hygiene before and during pregnancy. The Wilcoxon and McNemar tests ($\alpha=1\%$) were used to evaluate the differences in behavior before and during pregnancy. **Results:** Of the pregnant women evaluated, 33 women (12.6%) reported undergoing at least one dental consultation during their pregnancy. Of these women, 30 (11.4%) had at least one consultation during their first trimester, 10 (3.8%) during their second trimester, and 2 (0.8%) during their third trimester. Preventative and restorative treatments were the most common treatments. There were differences in the behaviors of women related to oral health before and during pregnancy. Subjects reported less frequent daily and post-meal tooth brushing and weekly dental floss and fluoridated mouthwash use during pregnancy compared to prepregnancy ($p<0.001$). They also reported eating more snacks ($p<0.001$) and meals ($p=0.011$) per day during pregnancy compared to prepregnancy. Only the habit of regular sugary food consumption did not vary significantly ($p=0.169$). **Conclusion:** There are behavioral changes during pregnancy that can cause dental caries and periodontal disease. Despite these concerns, dental health professionals are not adequately caring for pregnant women. Therefore, public policies incentivizing prenatal dental care are needed.

Key-words: Pregnancy; Dental Caries; Risky Behavior; Oral Hygiene; Eating Habits.

INTRODUCTION

Some of the oral changes associated with pregnancy include gingivitis gravidarium, pyogenic granuloma, and dental caries [1,2]. Although pregnancy itself is not responsible for these manifestations, changes in hormones and in oral health habits during pregnancy, such as a reduction in the frequency of brushing and an increase in food consumption, may aggravate or predispose women to caries as well as gum and periodontal diseases [1,3]. An increased uterine volume during pregnancy leads to increased compression of the stomach region, such that pregnant women reduce the quantity of food they consume at one time and eat more frequently throughout the day [4]. This change, together with a possible lack of oral hygiene care, could increase the possibility of caries development in pregnant woman [4].

Pregnant women show a higher level of gum inflammation than non-pregnant women with the same quantity of bacterial plaque [5]. There are reports of high frequencies of gum inflammation among pregnant

women [5,6]. Some studies suggest an association between pregnancy and periodontal disease [1], which has been investigated as a potential risk factor for premature and/or low-birth-weight newborns [7,8]. These evidences reinforce the fact that dental visits and dental treatment (DT) are needed during the prenatal period [1-3,7]. Good oral health is essential for maintaining the general health of the woman and fetus. When needed during pregnancy, DT should not be interrupted but incentivized [9]. However, in most cases, prenatal dental care is neglected; pregnant women visit the dentist less often than women who are not pregnant [10]. This fact may be related to a lack of knowledge about the safety of DT during pregnancy, anxiety, fear, access difficulties, and a low perception of the need for DT [11-15].

Therefore, the objective of this study was to evaluate changes in the dietary habits and oral hygiene of pregnant women, and to estimate their use of oral health services.

MATERIAL AND METHODS

This is a cross-sectional study nested in a prospective cohort of pregnant women in the city of São Luís, MA. The Ethics Committee of the University Hospital of the Federal University of Maranhão approved this study (case no.004417/2010-20).

The city of São Luís, capital of the State of Maranhão, is on an island located on the north coast of the State, in the Northeast region of the country. It has 1,027,098 inhabitants and a human development index (HDI) of 0.778, occupying first place in terms of population in Maranhão and 1,109th in Brazil [16]. São Luís is one of the poorest regions in the country; only 50% of the residents of São Luís are hooked up to the sewer system, and 75% of residents have running water. The main economic activities are the aluminum industry, the mineral exploitation of the Serra de Carajás, and the state production of soy, as well as trade and services [17].

This study included pregnant women who were undergoing prenatal checks at the Mother-Infant Hospital of the Federal University of Maranhão (UFMA). All of the subjects agreed to participate in the study after signing an informed consent form. A recruitment period of 8 months, beginning in July 2011, was established. Women were tracked through pregnancy and puerperium. Gestational age was established on the basis of ultrasound, which was routinely performed in the first trimester. When ultrasound results were not available, the date of the last menstruation (DLM) or a clinical estimate was used to determine gestational age. Women with twins and those who were in the high-risk category were excluded, because the routine prenatal care needed and the behavior of women are different in these situations compared to the average pregnancy scenario.

The sample was one of convenience because of the impossibility of obtaining a representative population sample of pregnant women in the city, given the lack of reliable registers of pregnant women receiving prenatal checks. The sample size was calculated with the Epi-Info software package (version 6.0). A sample of 227 women was estimated to be needed, given an infinite population, a 50.00% prevalence of the event (which maximizes the sample size when faced with an unknown value for the phenomenon), acceptable error of 6.5%, and confidence level of 95%. To account for possible sample drop-outs, the sample was increased by 15%, which resulted in a final sample of 262 women.

Women were interviewed with a semi-structured questionnaire that was comprised of different areas. Three areas were considered: sociodemographics (name; age; self-reported race, according to the guidelines of the Brazilian Institute of Geography and Statistics; DLM; number of pregnancies; economic class, according to Brazil's economic criteria; income; and educational level), DTs performed during pregnancy (seeking for DT, number of dental consultations in each trimester, and type of DT performed), and changes in oral health habits and behaviors (daily frequency of tooth brushing, habit of brushing after meals, weekly

frequency of dental floss and fluoridated mouthwash use, sugary food consumption habit, number of snacks per day, number of sugary snacks per day, number of meals per day, and frequency of nausea/vomiting during pregnancy).

Undergraduate and graduate students were trained to apply the questionnaire. After training, the supervised students administered the questionnaire to the subjects. A manual was used that contained instructions about how to fill out the instrument, collect data, and classify the variables according to criteria. The Kappa statistic (k) was used to estimate intra- and inter-examiner agreement. Only interviewers with $k > 0.85$ were selected.

Other methodological precautions were adopted to minimize potential biases. The instrument was previously tested and retested, and its terms and summary were adapted to make it valid. Some questions were repeated at different moments during the interview. Questions about socioeconomics, oral hygiene habits, and other questions that might generate constraint were asked at the end of the interview. The supervisor reviewed the questionnaires to prevent incoherence and inconsistencies. At the end of each day, the interviewer coded the answers, which were reviewed by the field supervisor. The research coordinator also reevaluated a subsample. In cases of doubt or flaws in filling out the questionnaire, the forms were returned for correction.

Data were processed by a professional with computer abilities. A subsample of the sample was entered twice, and the two inputs were compared to estimate the agreement and to correct any typing errors. Data were tabulated with the Excel software package and exported to Stata (version 9.0) and BioEstat, in which descriptive and inferential statistical analyses were performed. Absolute and percentage frequencies were estimated for the qualitative variables. The Shapiro-Wilk test was used to evaluate the normality of the data distribution. Medians (m) and the respective interquartile deviations (DI_q) were estimated for the quantitative variables. Box-plot graphs were created to describe the variables. Differences in dietary behavior and oral hygiene were compared with the McNemar and Wilcoxon tests. A significance level of 5% was adopted for rejection of the study's null hypotheses, which were as follows: the women showed no differences in dietary habits and oral hygiene habits between prepregnancy and during pregnancy.

RESULTS

The pregnant women evaluated had an average age of 24.9 ± 5.4 years, ranging from 13 to 41 years of age, including 40 adolescents (15.6%). The average gestational age at the time of the interview was 4.9 ± 2.2 months. Half of the women said they had a household income of up to R\$1,375.00 a month, representing 2.2

times the minimum wage. Of the 262 women involved in the study, 25.0% came from economic classes A and B, 64.1% were from class C, and 10.9% were from classes D and E. The quality of their oral health before gestation was self-reported as excellent/very good by 28 women (11.2%), good by 82 women (33.5%), and normal/poor by 139 women (55.4%). Ninety women (38.8%) said that their oral health worsened during pregnancy. Some women ($n=21$; 8.3%) stated that they stopped using toothpaste during pregnancy because it made them sick. In addition, 209 women (82.9%) reported experiencing frequent vomiting.

Of the 262 women evaluated, 33 women (12.6%) reported having had at least one dental consultation during their pregnancy. Of these, 30 women (11.4%) consulted a dentist at least once during their first trimester, 10 women (3.8%) during their second trimester, and 2 women (0.8%) during their third trimester. Among the DTs performed, most referred to preventative and restorative treatments. Local anesthetics were used in 4.2% of all the women

interviewed and in 34.4% of those who had a least one dental consultation during this period (Table 1).

We verified the differences in women's oral health behavior before and during pregnancy. The median frequency of daily brushing (before: $m=3$; $DIq=0$; during: $m=3$; $DIq=1$), weekly use of dental floss (before: $m=2$; $DIq=7$; during: $m=1$; $DIq=4$), and weekly use of mouthwash (before: $m=0$; $DIq=2$; during: $m=0$; $DIq=1$) were lower during pregnancy than before it ($p<0.001$). In contrast, the women reported eating more snacks ($p<0.001$) and meals ($p=0.01$) per day during pregnancy compared to before pregnancy. Only the frequency of the sugary food consumption did not vary significantly before and during pregnancy among the women evaluated. We identified a large number of discordant observations (outliers) for both periods, demonstrating the heterogeneity of the behaviors in this study sample (Figure 1).

Women reported reduced frequencies of post-meal tooth brushing ($p<0.001$) and sugary food consumption (not significant; $p=0.169$) (Table 2).

Table 1. Treatments performed during pregnancy. São Luís, MA, Brazil, 2011.

Variable	Yes		No		Did not say	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Consultation with a dentist	33	12.6	186	71.0	43	16.4
Topical application of fluoride	12	4.6	207	79.0	43	16.4
Scraping off of tartar	11	4.2	213	81.3	38	14.5
Restoration treatment	12	4.6	215	82.1	35	13.3
Endodontic treatment	4	1.5	219	83.6	39	14.9
Exodontia for caries	6	2.3	219	83.6	37	14.1
Local anesthesia	11	4.2	219	83.6	32	12.2
Other dental treatment	4	1.5	204	77.9	54	20.6

Table 2. Behavior of the women before and during pregnancy. São Luís, MA, Brazil, 2011.

Behavior	Before pregnancy		During this pregnancy		<i>p</i> -value
	<i>n</i>	%	<i>n</i>	%	
Brushing after meals					$<0.001^1$
Never	8	3.1	12	4.8	
Rarely	38	15.0	54	21.7	
Frequently	70	27.7	67	26.9	
Always	137	54.2	116	46.6	
Eating sweets					0.169 ²
Yes	164	79.2	156	75.4	
No	43	20.8	51	24.6	

The columns add up to 100%.

¹Wilcoxon Test. ²McNemar Test.

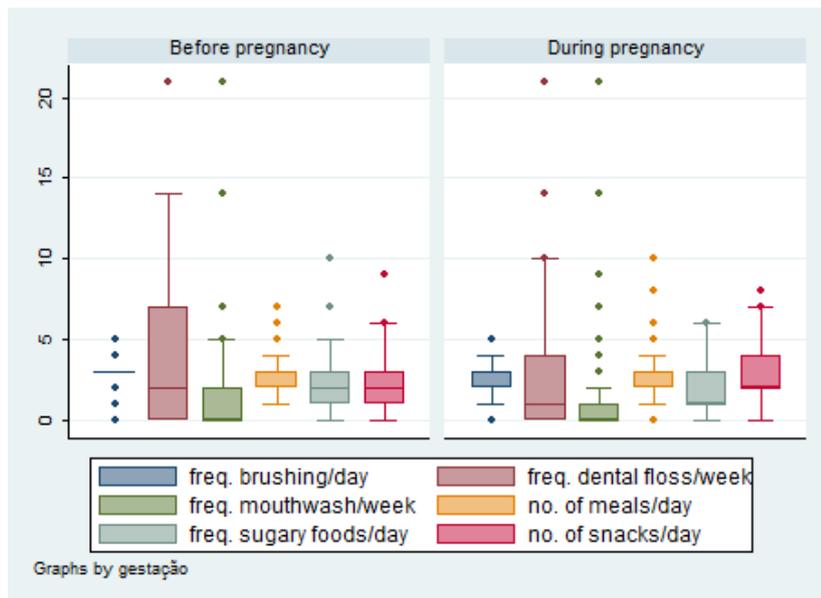


Figure 1. Box-plot of the frequency of dietary habits and oral hygiene before and during pregnancy. São Luís, MA, Brazil, 2011.

DISCUSSION

In this study, we compared the dietary behavior and oral health of women before and during pregnancy. We found a low frequency of DT among the women evaluated. Most of the DTs received were preventative or restorative treatments, which were mainly performed during the first trimester of pregnancy.

Although the women reported that the habit of sugary food consumption did not vary before and during pregnancy, women did consume more snacks and meals per day during pregnancy than prepregnancy. Therefore, these results suggest that women who already consumed sweet foods continued to eat them during pregnancy, but ate them more often. However, women who did not eat sweets often before pregnancy did not appear to change this habit. Women reported using dental floss, fluoridated mouthwash, and brushing teeth during the day and after meals less often during pregnancy than before it. These behavioral changes can lead to caries and periodontal disease during pregnancy [4]. Thus, policies to raise awareness among women and health teams about the need for preventative or interceptive DT during pregnancy, as well as prenatal dental checks, are clearly needed.

The findings in the present study are similar to results found in 102 pregnant women in Joao Pessoa, PB [18], and in 80 pregnant women in the city of Maringa, PR [19]. The first study found that 62% of women reduced their frequency of daily brushing, and 68.5% increased the frequency with which they consumed sugary foods during pregnancy [18]. In the second study [19], only 27.5% of women reported that they were brushing their teeth less often than before pregnancy.

The frequency of eating increased for 77.5% of women and the consumption of sugar for 65%. The differences observed in sugar consumption could be due to cultural or methodological differences between the studies.

In the USA, 497 of 599 pregnant women (83%) reported brushing their teeth at least once or twice a day, and 24% ($n=141$) reported using dental floss [20]. In London, an evaluation of pregnant immigrant women [21] observed that the habit of tooth brushing less than twice a day was 57%, whereas the use of fluoridated mouthwash was reported by 51% of the sample. In Turkey, 57% of those interviewed reported brushing their teeth more than once a day [22], 8% reported using dental floss, and 3% reported using mouthwash. Studies performed in Brazil have shown a higher self-reported frequency for oral hygiene habits among pregnant women. For example, in a study from Maringa, PR, 42% of the sample reported brushing three times a day and 68.7% reported regularly using dental floss [19]. These results are similar to the findings of our investigation, which recorded a frequency of brushing ≥ 3 times a day among 61.73% of the women, dental floss use by 56.7% of women, and mouthwash use by 26.4% of women.

Only a small quantity (12.61%) of the women evaluated in this study reported having any kind of DT during pregnancy. Out of this total, most sought assistance during the first trimester, followed by the second and third trimesters. The most commonly reported procedures were the topical application of fluoride and restorative treatment, followed by basic periodontal treatment. Similarly, a study performed in the city of Anápolis, GO [11], found that 17.14% of the women interviewed had visited dental surgeons during their pregnancy. Although many of the 204 women interviewed in a study performed in Salvador, BA [23]

reported the presence of symptoms, only 7.4% of them went to the dentist. This percentage was higher (27%) among women receiving care from the Basic Health Units of Araçatuba, SP [12], and in a study of Maringá, PR [24], which showed that 40% of the 80 women interviewed underwent DT during pregnancy. In the USA, the frequency of women reporting DT during pregnancy ranges from 26% to 49% [10,20,25]. In Malaysia, most of the women interviewed in 2008 had oral health problems, including caries, although only 29% of them reported visiting the dentist during their pregnancy [13]. In the United Arab Emirates [26], 58.3% of 800 women reported that they had visited the dentist during their most recent pregnancy.

Several studies have shown that women tend to visit the dentist less often during pregnancy [10,27]. A study of 823 American women showed that 66% chose to postpone all dental care until after the birth [10]. The dentists interviewed preferred to treat their pregnant patients during the first trimester, consistent with the findings of the present study. However, studies have shown that the second trimester is actually the safest period for routine DT, although treatments can be performed at any time during pregnancy, if needed [28,29]. The literature cites many reasons as obstacles to seeking oral health care services during pregnancy, including fear and anxiety about DTs, a low perception of oral problems, difficulty in accessing services, a long waiting time at the clinic, a lack of money, will, or time, as well as beliefs/myths and imprecise information about the effects of DTs on the fetus [11-15].

In our study, the most common DTs performed were preventative and restorative procedures. This result differs from that observed in other studies [13,19]. The main motive for seeking DT among pregnant in a national study [19] was pain/urgency (53%), and only 9% of individuals sought DT for prevention.

Pregnant women in Brazil do not receive sufficient guidance about the possibility of receiving DT and the etiology of oral health problems [14,23,30]. This idea was also evident in a study performed in Feira de Santana, BA, in which 95.45% of the women interviewed believed that a pregnant woman should not undergo certain dental procedures [23]. In another study, a high proportion of women (34.48%) reported having heard that undergoing DT during pregnancy harms the baby [11]. In Malaysia [13], this percentage was lower (15.9%). Current studies support the idea that dental care can and should be maintained during the prenatal period [10,13,23].

When performing DTs in pregnant women, certain precautions should be taken: women should be hydrated and should consume a meal rich in protein and carbohydrates before the DT, short DT sessions should be used, the dental chair should be comfortably positioned, and the preference should be for evening appointments to avoid morning sickness. Professionals should be sensitive to the needs of DT during pregnancy, acting to prevent major oral diseases and in possible emergencies [14,31]. Urgent cases should be resolved

regardless of the gestation of the pregnancy. To conduct emergent DT, the dental surgeon should clarify to the patient, in terms of risk-benefit analysis, that a lack of action is worse than treatment. The consequences of not having treatment include pain-induced stress and a risk of infection [25]. Nevertheless, extensive oral rehabilitations and invasive surgeries should preferably be performed after pregnancy [14].

In many cases, refusal to submit to DT revolves around a pregnant women's belief that she should not undergo local anesthesia, even in cases of pain, due to a risk of fetal abnormalities or pregnancy loss [32]. Consistent with this notion, we observed a low frequency for the use of local anesthetics (4.2%). For cases in which anesthesia is necessary, pregnancy is not a contraindication. The safest anesthetic solution for pregnant women is lidocaine (2%) with adrenalin (1:100.000), to a maximum limit of 2anesthetic tubes (3.6ml) per session, with slow injection of the solution [32].

The main limitations of this study were the use of a sample design based on convenience, especially including middle-class women; and the self-reporting of health behaviors, which could have led to some bias in the estimates. However, we used some methodological strategies to reduce this problem. We visited the place of study on a daily basis over the time course of the experiment (8 months), and all eligible women were invited to participate in the study. The data collection instrument, which had been previously tested, was developed with an eye to reducing possible constraints on the women. The interview team was exhaustively trained and underwent practice in the field, and a study manual was written. The interviews were performed blindly. Some data were checked in the registers or on the patient card. In addition, some questions were repeated, to evaluate inconsistencies. The use of a prospective cohort allowed the acquisition of reliable ties with the study team and increased the data validity.

The main advantages of this study were the relevance of the topic, which has been little studied; the controlled design, which allowed us to perform comparisons; the sample size, which was increased to detect differences between the groups; and the 1% significance level, which allowed us to make inferences with greater precision. Moreover, few studies have been performed in the less-developed areas of northeast Brazil to identify changes in oral health behavior before and during pregnancy. Together with our use of multiple indicators and consolidated strategies, these attributes make this study particularly interesting. This study may help in the planning and implementation of public policies for the health of pregnant women, and could serve to demystify beliefs and myths that influence whether Brazilian women are offered DT.

CONCLUSION

There are behavioral changes during pregnancy that

can lead to dental caries and periodontal disease during this period. However, despite the need for it, pregnant women do not receive adequate care from oral health professionals. This finding indicates a need to implement public policies to incentivize prenatal dental care.

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