Knowledge, attitudes and practices of undergraduate and dentists about dental prenatal care

Running title: Knowledge about dental prenatal care

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Experimental design and ethical aspects

This observational, cross-sectional and descriptive study followed the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) and was carried out after approval by the Human Research Ethics Committee from the Bauru School of Dentistry - University of São Paulo (CAAE 38327220.9.0000.5417).

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ABSTRACT

This study aimed to evaluate the knowledge, attitudes, practices of undergraduate and professionals, both from the public and from private sectors in Brazil, regarding dental prenatal care. This study corresponded to an online questionnaire survey, via Google Forms, consisting of 17 general questions for undergraduates (n = 103) and 16 for professionals (n = 227) for demographic and school mapping, and 18 specific questions about the importance and protocol of dental prenatal care. T test, Mann-Whitney U test and multiple linear regression were adopted ($p < 0.05$). The average total score of the questionnaire for students and professionals was 12.40 and 15.65, respectively ($p < 0.0001$), indicating moderate knowledge. Professionals showed a higher prevalence of moderate (77%) and high (2%) knowledge of the subject when compared to undergraduate students (51% and 0%, respectively). The graduation period in which the students were enrolled was a predictor of the total score of the questionnaire [$F(1, 101) = 21.21$; $p < 0.0001$; $R^2 = 0.165$]. The female gender and the lower weekly workload were the main predictors of the total score of the questionnaire for professionals [$F(3, 223) = 6.74$; $p < 0.0001$; $R^2 = 0.083$]. It is concluded that although professionals have greater knowledge about dental prenatal care than students, there are still deficiencies in the knowledge and practices of them in respect of dental management during pregnancy. Higher education institutions need to change the teaching-learning plan regarding the holistic dental approach for women during pregnancy.

Keywords: Prenatal care. Pregnancy. Oral Health.

INTRODUCTION

The concept of “health promotion” is marked by the historical process of recognizing the limitations of the traditional approach in dealing with the health-disease process and changing the understanding of health determinants.

Prenatal care is a fundamental moment for health promotion to be carried out, since at that moment women are more receptive to new knowledge, with the aim of providing better health care for the baby. Thus, successful health education strategies during pregnancy may influence the health condition of the family as a whole, since women may act as an instrument for the dissemination of information to other family members.[1,2]

In recent years, several studies have sought to assess oral changes during pregnancy.[3,4] In view of the reduction in the antimicrobial activity of peripheral neutrophils and the high levels of estrogen and progesterone, women are more prone to inflammation in periodontal tissues.[5] Recently, some studies have highlighted that women with systemic impairments, such as obesity, diabetes mellitus and hypertension, may have an even more exacerbated inflammation in the periodontal tissues.[6,7] Current evidence also suggests that inflammation in periodontal tissues may harm the baby's health, resulting, for example, in prematurity and low birth weight.[8,9]

Considering that women are exposed to the greatest risk of periodontal diseases, which, in turn, can harm perinatal outcomes, it is extremely important that professionals (doctors and dentists) act in an interdisciplinary way and propose an integrated protocol of prenatal care. Therefore, the concept of dental prenatal care has been disseminated to provide greater understanding and management of the mother-fetus binomial.

On the other hand, there are still many taboos, fears and insecurities about the dental care of women during pregnancy, resulting from the lack of knowledge of the professionals who work in clinical practice. In view of this scenario, the restructuring of the curricular matrices of Higher Education Institutions is necessary in order to contribute to better training and qualification of students to be able to attend pregnant women.[10] The aim of this study was to evaluate the knowledge, attitudes, practices of undergraduate students and dentists (professionals and/or post-graduate students), both from the public and from private sectors in Brazil regarding dental prenatal care.

MATERIAL AND METHODS

Experimental design and ethical aspects

This observational, cross-sectional and descriptive study followed the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology)[11] and CHERRIES (Checklist for Reporting Results of Internet E-Surveys)[12]. This study was carried out after approval by the Human Research Ethics Committee.

Sample selection

The dissemination of the study was carried out through information channels produced by the communication departments of Higher Education Institutions in several states in Brazil, through Newsletters from the Secretaries of Health of some municipalities in Brazil and through social media of students and Dentistry professionals. As this is an "open" and voluntary survey, this study had a convenience sample.

Responses were obtained from 103 undergraduate students from different Higher Education Institutions in 13 states in Brazil and 227 dental professionals from 21 states in Brazil between October/2020 and April/2021.

Eligibility criteria

The sample consisted of undergraduate dentistry students (from the first to the last year of the course); at least 18 years old; who attended public and/or private universities regularly registered with the Ministry of Education; and dentists (clinical professionals, academics and/or post-graduate students) from all regions of Brazil, who were properly registered with the profession's regulatory agency; and who worked in the public or private health system.

Students under 18 years old were not considered in the sample; as well as professionals who were not properly registered with the profession's regulatory agency; and also, students or professionals from foreign institutions.

Details of the questionnaire

The questionnaire was developed using Google Forms and was composed of multiple-choice questions. The whole questionnaire had four pages, but the first one was related to the consent to participate in the research and with two other questions to identify the individual as student or professional, as well as their emails. Afterward, the questions were structured into three main parts (each part organized in a specific page of the online questionnaire): the first part determined the demographic data of the sample (gender, age,

state of residence or practice) with three questions only. The second part addressed the professional and educational characteristics of the participants (professional and academic experience, associated with public or private sector, conducting post-graduate courses, and participation in scientific events). In the second part, there were 14 and 13 questions for students and professional, respectively. The third part included 18 specific questions for all participants related to their knowledge, attitudes and practices in the dental management of women during pregnancy.

The usability and technical functionality of the electronic questionnaire were previouslly tested with a pilot sample composed of 20 individuals. At the end of this preliminary questionnaire, the 20 participants could report any problem, difficulty, incongruity and inconsistency in the questionnaire. Furthermore, the 20 participants qualitatively evaluated the questionnaire regarding the response time. All these considerations made by the first 20 participants were taken into account so that we could make minor adjustments to the questionnaire before its application itself. The 20 responses referring to the pilot sample were not considered in the final data of this study.

All questions required, necessarily, at least one answer. It was not possible to complete/send the questionnaire if any question had not been answered. In all questions, respondents were allowed to choose the option “not applicable” or “rather not say”. All questions required, necessarily, at least one answer. It was not possible to complete/send the questionnaire if any question had not been answered. In all questions, respondents were allowed to choose the option “not applicable” or “rather not say”. At the end of the questionnaire, respondents could review their responses before submitting and, if necessary, come back to change any responses. However, no consistency or integrity check was performed before the questionnaire was submitted (with, for example, JAVAScript).

The questionnaire required participants to include full name and email. The answers were completely blind, but this information was used to preventing multiple entries from the same individual. In case of duplication, the first submission would be considered. However, there were no duplicate responses regarding the questionnaire in this study.

Statistical analysis

Data were organized in Excel 2016 spreadsheets for Windows 10 (Microsoft Corp., Redmond, WA, USA) and quantitative and descriptive analyses were performed with absolute numbers, percentages, means and/or medians.

For the assessment of participants' knowledge regarding dental prenatal care, each question received a score between 0-2 points: zero when the respondent did not correctly

answer the question; one when answered partially correct; and two when the question was answered correctly. Each respondent was assigned a total score from the questionnaire, which could range from zero to 36 points. The level of knowledge about dental prenatal care for each participant was categorized into: no knowledge (total score = 0); low knowledge (total score = 1 to 12 points); moderate knowledge (total score = 13 to 24 points); and high knowledge (total score = 25 to 36 points). Finally, the average total score was calculated for undergraduate students and professionals.

First, the questionnaire's total score variable was tested for normal distribution using the Kolmogorov-Smirnov test. Subsequently, knowledge on the subject was compared between undergraduates and professionals (Mann-Whitney test) and between professionals working in the public and private health sector (t-test).

Multiple linear regression (Backward method) was adopted to evaluate the independent variables related to the total score of the questionnaire on dental prenatal care (outcome), both for undergraduate students and professionals. In the multiple linear regression in which the outcome was the total score of the questionnaires of the students, the analysis of the residues was performed, indicating that the residues were independent (Durbin-Watson = 1.93); there were no outliers; were normally distributed; and homoscedasticity was observed. The tolerance values were greater than 0.90 and the Variance Inflation Factor (VIF) was less than 2, indicating the absence of multicollinearity. Therefore, all prerequisites for performing multiple linear regression were met. In multiple linear regression in which the outcome was the total score of the questionnaires of professionals, the analysis of the residues was performed, indicating that the residues were independent (Durbin-Watson = 1.97); there were no outliers; were normally distributed; and homoscedasticity was observed. The tolerance values were greater than 0.20 and the VIF was less than 4, indicating the absence of multicollinearity. Therefore, all prerequisites for performing multiple linear regression were met. A significance level of 5% was adopted for all situations.

RESULTS

A total of 330 individuals answered the questionnaire, 103 students regularly enrolled in the Dentistry undergraduate course and 227 participants who had already obtained the title of dentist. Most of the sample was female, both for undergraduate students (67%) and for professionals and post-graduate students (77.5%). As this is an "open" survey, which was published on social media, university departments and health departments in different municipalities, it was not possible to calculate the view rate of this study. Only two

participants, when accessing the link, did not consent to participate in the survey. Thus, for them, the questionnaire was stopped immediately after checking this option. Everyone who agreed to participate in the survey completed the entire questionnaire. Thus, the participation rate and completion rate for this study were 99.39% and 100%, respectively.

Most respondents were from southeastern Brazil, both for undergraduate students (n = 68; 66%) and professionals (n = 148; 65%), and they were mainly from São Paulo (63 undergraduate students and 125 professionals).

Most undergraduate students were between 18 and 30 years old (94.17%) and only 4.86% (n = 5) and 0.97% (n = 1) were between 31-40 years old, and 41-50 years old, respectively. Among the professionals, most were between 18 and 30 years old (63.88%), while 15.42% (n = 35), 14.10% (n = 32), 5.72% (n = 13) and 0.88% (n = 2) were between 31-40 years old; 41-50 years old; 51-60 years old; and over 60 years old, respectively.

Undergraduate students from private institutions of higher education provided most responses (56.31%). Most of them were in the 4th (n = 42) and 3rd (n = 26) years of Dentistry. Approximately 31% and 32% of the students indicated having experience with monitoring and scientific research during graduation, respectively. More than 85% of the students (n = 88) declared that they regularly participated in scientific events. On a scale of 0 to 10 points, the students pointed an average of 5.4 points with respect to knowledge, practice and attitudes about dental management during pregnancy.

The analysis of undergraduate students' knowledge about dental prenatal care showed that a high prevalence was not able to associate the anemia with dental caries during pregnancy (89%); nor the excessive gestational weight gain (GWG) (62%), arterial hypertension/pre-eclampsia (57%); and maternal obesity (43%) with the worst periodontal parameters. However, the majority (78%) correctly associated the Gestational Diabetes Mellitus (GDM) with damage to periodontal tissues.

Regarding the care of women during pregnancy, 43% of the students stated that it can be performed in all periods of pregnancy for any dental treatment as long as there is a plausible justification, 22.33% stated that women can only be attended during pregnancy in emergency dental situations or did not know how to answer about this topic. In addition, 31% of them were unable to correctly point out the managements to avoid syncope of the inferior vena cava during dental treatment; however, 55% of undergraduates were aware of the need to avoid the supine position for the care of pregnant women.

Students pointed out the following indications for interventions during pregnancy: dental prophylaxis (94%), restorations (81%), periodontal scraping (with curettes or

ultrasound) (73%) and application of high or low concentrations of fluoride (63%). In contrast, endodontic access (35%), endodontic treatment (25%) and dental extractions (17%) were the procedures least cited by undergraduates.

More than 77% of students were unable to respond regarding dental radiography indications/recommendations during pregnancy and 20% correctly stated that dental radiography could be performed in all periods of pregnancy for any dental intervention as long as there is a plausible justification.

Approximately 45% of the students were unable to answer correctly about the use of local anesthetics during pregnancy. Although 52% of them prioritize the use of lidocaine with 2% epinephrine (1:100,000), only 10% correctly stated that preference should be given to anesthetic solutions with greater capacity for binding to plasma proteins.

Among the analgesics/anti-inflammatories recommended by students, the main ones were: acetaminophen (paracetamol) (44%), ibuprofen (30%) and nimesulide (20%). However, 34% of the students indicated that they did not know how to answer which analgesic/anti-inflammatory drugs they would recommend to pregnant women.

More than 55% of the students indicated the use of amoxicillin during pregnancy. Other options were as follows: penicillin (23%), clindamycin (16%) and cephalosporin (10%). However, approximately 44% said they did not know which antibiotics should be indicated. 42% contraindicated, mainly, tetracycline, however, more than 51% said they did not know which antibiotics should be contraindicated during pregnancy.

Approximately 74% of students did not know whether the vitamin supplement commonly ingested by pregnant women should contain fluoride in its composition, while 26% correctly stated that the vitamin supplement should not contain fluoride in its composition as it can harm the gestation.

Almost 78% of students did not know the correct clinical management for pyogenic granuloma treatment during pregnancy. 32% of them pointed out that surgical removal of the lesion should be performed only after the baby is born; 30% stated that surgical removal should be performed only in the 2nd trimester and, when not performed, the lesion should be removed only after the baby is born.

On a scale of 0 to 36 points, the total average score of the questionnaire by undergraduate dentistry students was 12.40. Approximately 3% (n = 3) of the students showed no knowledge about dental prenatal care; 46% (n = 48) had low knowledge; 51% (n = 52) had moderate knowledge; and no undergraduate was classified as having high knowledge about dental prenatal care.

In multiple linear regression, the variables included in the initial model were gender, type of university (public or private), period in which the student was enrolled in an undergraduate course, scientific research/monitoring experience and regular participation in scientific events. The analysis resulted in a statistically significant model [$F(1, 101) = 21.21$; $p < 0.0001$; $R^2 = 0.165$] (Table 1). The final model was composed by the period of enrollment in graduation ($\beta = 1.942$; $t = 4.606$; $p < 0.0001$), showing the association of this variable with the total score of the questionnaire on the undergraduate students' knowledge about dental prenatal care.

Almost 48% of all professionals (n = 109) declared to have attended or to be attending master's, doctoral and/or postdoctoral, while approximately 72% (n = 162) declared that had attended or were attending specialization. The average weekly workload of the professionals was 40 hours. Approximately 29% (n = 64) declared to work in their own private dental clinic, 39% (n = 88) declared to work in another professional's dental clinic and 21% declared to work in the public health sector (n = 47).

More than 78% of professionals (n = 178) stated that they regularly participated in scientific events. On a scale of 0 to 10 points, they pointed an average of 5.7 points with respect to knowledge about dental prenatal care.

A high prevalence of professionals was not able to associate the anemia with dental caries during pregnancy (94%); and, the excessive GWG (69%), arterial hypertension/pre-eclampsia (67%); and maternal obesity (49%) with periodontal impairments. However, the majority (92%) correctly associated the GDM with periodontal tissue damage.

Sixty-five percent of professionals stated that dental intervention during pregnancy could be performed in all periods of pregnancy for any dental treatment as long as there is a plausible justification, 13.21% stated that women should only be attended during pregnancy in situations of dental urgency or they did not know how to answer this topic. Furthermore, 19% were unable to highlight the managements to avoid syncope of the inferior vena cava during dental treatment; however, 60% of the professionals were aware of the need to avoid the supine position during the intervention in pregnant women.

Most professionals recommend the following procedures during pregnancy: dental prophylaxis (94%), restorations (92%), periodontal scraping (with curettes or ultrasound) (79%), endodontic access (73%) and application of high or low concentrations of fluoride (57%). In contrast, dental extractions (47%) and endodontic treatment (38%) were the procedures least cited by professionals.

More than 57% of professionals were unable to respond regarding the indications/recommendations of dental radiography during pregnancy and 37% correctly stated that dental radiography could be performed in all periods of pregnancy for any dental intervention as long as there is a plausible justification.

Approximately 22% of professionals did not know how to answer correctly about the use of local anesthetics during pregnancy. Although 70% of them prioritize the use of lidocaine with 2% epinephrine (1:100,000), 13% correctly stated that preference should be given to anesthetic solutions with greater capacity for binding to plasma proteins.

Among the analgesics/anti-inflammatories, professionals mainly recommended acetaminophen (paracetamol) (78%). The minority indicated ibuprofen (24%) and nimesulide (10%). Only 10% were unable to answer which analgesic/anti-inflammatory they would indicate to pregnant women.

Approximately 80% of professionals indicated that amoxicillin was the main antibiotic used by pregnant women. Other options were as follows: penicillin (34%), clindamycin (25%) and cephalosporin (17%). However, approximately 11% said they did not know which antibiotics should be indicated. On the other hand, 74% of the patients contraindicated tetracycline, however, more than 21% stated that they did not know which antibiotics should be contraindicated during pregnancy.

Approximately 62% of professionals were unable to say whether the vitamin supplement commonly ingested by pregnant women should contain fluoride in its composition, while only 38% correctly stated that the vitamin supplement should not contain fluoride as it could harm the gestation.

Almost 60% of professionals did not know the correct clinical treatment of a pyogenic granuloma during pregnancy. Among them, 22% indicated that surgical removal should be performed only after the baby is born and 25% stated that it should be performed only in the 2nd trimester and, when not performed, it should be performed after delivery.

On a scale of 0 to 36 points, the total average score of the questionnaire by professionals was 15.65. Almost 21% of them (n = 49) had little knowledge about dental prenatal care; 77% (n = 174) had moderate knowledge; and 2% (n = 4) had high knowledge about dental prenatal care.

Although professionals in the public health sector showed a higher average of the total score of the questionnaire compared to professionals in the private sector, there were no statistically significant differences between them (p = 0.287) (Figure 1).

When compared, professionals showed higher total scores for knowledge about dental prenatal care than students, with statistically significant differences ($p < 0.0001$) (Figure 2).

In multiple linear regression, the variables included in the initial model were gender, age, post-graduate status, time of experience in the profession, weekly workload, and regular participation in scientific events. The analysis resulted in a statistically significant model [$F(3, 223) = 6.74$; $p < 0.0001$; $R2 = 0.083$] (Table 2). The final model was composed of the following variables: gender ($\beta = 1.446$; $t = 2.192$; $p = 0.0294$), postgraduation ($\beta = -1.317$; $t = -1.663$; $p = 0.0977$) and weekly workload ($\beta = -0.595$; $t = -3.310$; $p = 0.0011$). Only gender (0 = male; 1 = female) and weekly workload showed statistically significant associations with the outcome. The value of the negative coefficient for the variables "post-graduate status" (0 = with post-graduation course; 1 = without post-graduation course) and "weekly workload" indicated that people who have had post-graduation and lower weekly workload showed higher scores in the questionnaire about dental prenatal care.

DISCUSSION

The main findings of this study highlight deficiencies in the knowledge and attitudes of students and dental professionals in relation to dental prenatal care. Overall, the participants had moderate knowledge. The period in which undergraduate students were enrolled in course influenced the degree of knowledge about dental prenatal care. Likewise, the female gender and lower weekly workload of professionals were predictors of a higher degree of knowledge on the subject.

Previous studies sought to assess the knowledge of undergraduate and dentists about dental prenatal care;[13-15] however, the authors did not adopted the topic about the interrelation of pregnancy with systemic impairments and their repercussions in the oral cavity. The results of this study showed that although the majority of students and professionals (78% and 92%, respectively) correctly associated the GDM with damage to periodontal tissues, a high prevalence was not able to associate the anemia with dental caries during pregnancy (89% and 94%, respectively); and the excessive GWG (62% and 69%, respectively), arterial hypertension/pre-eclampsia (57% and 67%, respectively); and maternal obesity (43% and 49%, respectively) with the worst periodontal parameters.

The hypothesis that explains about the association between gestational anemia and dental caries is that the presence of iron is a protective factor in the tooth decay process, since it affects acidogenicity and inhibits the activity of *Streptococcus mutans*

glycosyltransferase. In this way, the iron inhibits the activity of bacteria that are present in dental caries and reduces the production of extracellular polysaccharides.[16]

The hypothesis that explains the association between excessive GWG and periodontitis is similar to the one that reinforces the association of maternal obesity and periodontitis. Obesity and high intake of macronutrients are associated with the accumulation of lipids in adipocytes and expansion of adipose tissue, which may initiate an inflammatory process through the production of pro-inflammatory cytokines and chemokines, such as the tumor necrosis factor alpha (TNF-a), interleukin 6 (IL-6) and C-reactive protein (CRP), by adipocytes.[17-26] As a result, overweight patients have generalized inflammation and, consequently, impaired immune response. Therefore, even with small amount of dental plaque, individuals with overweight may present an exacerbated periodontal inflammation.[5,19-27] These mechanisms are intensified during pregnancy as a result of high levels of progesterone and estrogen. Jesuino et al. (2020) highlighted that pregnant women with excessive GWG have a high prevalence of hypertension and periodontitis, with periodontitis persisting even after delivery. Furthermore, excessive GWG was significantly associated with high BMI of newborns.[22]

The direction of the association between arterial hypertension and periodontitis is still unclear. A systematic review and meta-analysis by Muñoz-Aguilera et al. (2020) showed that the diagnosis of periodontitis increases the probability of occurrence of hypertension.[28] The association between these outcomes may be explained by the influence of high levels of inflammatory mediators, which cause vascular inflammation. In the process of vascular inflammation, there is an increase in vascular permeability, promoting changes in the cytoskeleton of endothelial cells that, consequently, imply endothelial dysfunction, resulting in an imbalance between vasodilation and vasoconstriction. Considering the inflammatory mediators active in this process, vasoconstriction becomes more intense, causing an increase in blood pressure that is clinically diagnosed as hypertension.[29-31]

This study pointed out that 22.33% of undergraduate students and 13.21% of professionals believed that women could be attended during pregnancy only in emergency dental situations or stated that they did not know in which periods of pregnancy women could be assisted by dentists. Martins et al. (2013) found that 57.7% of dentists agree that the second trimester is the safest period for treatment and 29.2% believe that they may treat pregnant women in any gestational period.[15] Bernardi, Oliveira and Masiero (2019), on the other hand, showed that only 11.9% of professionals working in the public health sector believed that care should only take place in the 2nd trimester of pregnancy or in urgent situations, while 88.1% believed that the assistance could occur at any gestational period.[14]

Elias et al. (2018) pointed out that among dentistry students, 17.2% were unable to answer the best period for dental treatment during pregnancy and 56.6% indicated the 2nd trimester.[13] Garbin et al. (2006) pointed out that 84.8% of students answered correctly that the second trimester is the ideal period for dental treatment.[32] It is important to note that, although the 2nd trimester is the most suitable for dental treatment, women can be attended at any period of pregnancy, as long as there are plausible justifications and all precautions are taken.

In the third trimester there is an increased risk of syncope and hypertension. Dental care with the patient in the supine position should be avoided in order to reduce the risk of compression of the inferior vena cava, which could impair the venous return and oxygenation of women. In this study, 31% and 19% of undergraduates and professionals, respectively, were unable to point out correctly all the managements to avoid syncope of the inferior vena cava. However, 55% and 60% of them, respectively, are aware of the need to avoid the care of pregnant women in the supine position.[33,34]

There is a taboo in dentistry, both for the population in general and for some dentists, about the dental radiographs in pregnant women. Usually, dental radiography should be avoided in the first trimester of pregnancy, especially between the 4th and 5th gestational weeks, due to organogenesis being a critical moment. However, if all preventive measures are properly adopted, such as wearing a lead coat, and adjusting the dose and duration of the X-rays, there is no need to avoid or postpone the radiological examinations for the postpartum period.[33,35,36]

In this study, more than 77% of students and 57% of professionals were unable to answer correctly regarding the indications/recommendations of dental radiographs during pregnancy. Only 20% and 37% of them, respectively, correctly stated that dental radiography can be performed in all periods of pregnancy for any dental intervention as long as there is a plausible justification. Elias et al. (2018) showed that 14.9% of students did not know about the possibility of exposure of pregnant women to dental radiography and 26% would not indicate dental radiography.[13] Among the professionals, Bernardi et al. (2019) stated that 7.1% did not agree with radiographic examinations during pregnancy and 26.2% agree only in emergency dental situations.[14] Martins et al. (2013) found that 45.3% of professionals did not take radiographic images of pregnant women because they believe in teratogenic effects resulting from these procedures.[15]

In this study, most professionals (70%) would correctly indicate the use of lidocaine with 2% epinephrine (1:100,000) as an anesthetic of first choice during pregnancy, corroborating with previous findings.[14,15] However, more than 45% of undergraduate

students were unable to answer about the use/indication of local anesthetics during pregnancy. These results confirm the findings of Elias et al. (2018), in which they stated that only 33% of students were right about the safest anesthetic for pregnant women.[13]

Elias et al. (2018) found that 46% of the students were unable to answer which medications could be prescribed for the pregnant woman. In that study, most students indicated paracetamol for pain control and, in relation to antibiotics, 39% of students recommended amoxicillin.[13] In this study, 34% of the students did not know about the indication of medications during pregnancy for pain control and 44% indicated acetaminophen (paracetamol). More than 55% indicated the use of amoxicillin as a first-choice antibiotic for pregnant women and 44% said they did not know which antibiotic should be indicated.

Professionals showed greater knowledge regarding drug therapy during pregnancy when compared to students. Approximately 10% were unable to indicate the analgesics/anti-inflammatories and antibiotics for pregnant women. Acetaminophen was the professionals' first-choice medication for pain control in pregnant women (78%) and amoxicillin the main antibiotic in situations of infection (80%). Our findings are in agreement with previous findings about the practices and attitudes of professionals regarding drug therapy during pregnancy.[14,15]

Paracetamol is an analgesic that, when used in therapeutic doses, has no teratogenic effects and can be used safely to treat mild to moderate pain at any stage of pregnancy, thus being the most suitable analgesics for pregnant women that are available.[33,35,37] To prevent and treat oral infections during pregnancy, the antibiotic of choice is penicillin. Because they have a specific effect on substances in the bacterial cell wall, they do not harm the mother or fetus. Amoxicillin and Ampicillin are the most indicated, cephalosporins and macrolides are other options belonging to the same group.

A high prevalence of students (78%) and professionals (62%) did not know whether the vitamin supplement commonly ingested by pregnant women should contain fluoride in its composition. There is strong evidence in the literature that does not recommend the administration of vitamin supplements containing fluoride, since, in addition to not contributing to the prevention of dental caries for women and children, the presence of fluoride in the compound considerably reduces the absorption of calcium from vitamin complex, harming women's health, since calcium is a fundamental compound to be replaced in pregnancy.[38]

Pyogenic granuloma is another oral consequence commonly observed during pregnancy. This hyperplastic vascular lesion is caused by the high levels of progesterone

and estrogen and the presence of dental biofilm. Lesions surgically removed during pregnancy have a higher risk of recurrence within the gestational period.[5,39] Therefore, it is recommended to perform periodontal scraping, prophylaxis and to guide patients on proper hygiene. Surgery is only recommended during pregnancy if the lesions have excessive bleeding and impair chewing due to trauma. In this study, 78% of undergraduate students and almost 60% of professionals did not know about the treatment of a pyogenic granuloma of a pregnant woman during the 3rd trimester who reported impaired chewing due to the excessive volume of lesion.

The total score of the questionnaire revealed that 46% of students and 26% of professionals had low knowledge about dental prenatal care, and 51% and 77% of them, respectively, had moderate knowledge about the subject. Only 2% of professionals showed high knowledge about dental prenatal care. There were no differences in the knowledge of students enrolled in public and private institutions, nor among professionals who work in public and private health sectors (Figure 1). Professionals showed greater knowledge when compared to students ($p < 0.0001$; Figure 2).

The linear regression model showed that the period in which the students were enrolled in the dentistry was decisive for the highest score in the questionnaire (Table 1). For the professionals, gender (female), post-graduate status and lower weekly workload were associated with higher knowledge about dental prenatal care (Table 2). Only gender and weekly workload had statistically significant values.

We hypothesized that women had greater knowledge on the subject because they may have gone through pregnancies or, even more, because they are more attentive to their body's signals in the face of hormonal changes. On the other hand, the hypothesis that may explain the association of a lower weekly workload with greater knowledge about dental prenatal care is that these individuals have more time to update themselves in post-graduate courses, reinforcing the most current clinical evidence.

Some limitations should be pointed out for this study. As it is a questionnaire survey, we must consider that there is subjectivity in the interpretation of the questions by the participants, resulting from the lack of a standardized explanation from the applicators. The small sample size makes it impossible for this study to be considered population-based. Ideally, future studies should evaluate students and professionals longitudinally, before and after educational interventions, in order to ensure that the educational strategy is effective and information on the subject in question is disseminated.

Despite the limitations, this study had a wide scope and evaluated not only the knowledge and attitudes of students and professionals in the dental management of

pregnant women, but also the theoretical knowledge about the oral repercussions of pregnant women with systemic impairments. Based on our results, it is expected that education strategies are adopted by regular undergraduate and post-graduate courses to ensure greater success in the dental treatment of women during pregnancy.

CONCLUSIONS

There are deficiencies in the knowledge and attitudes of dental students and professionals regarding dental prenatal care. The period in which the undergraduate students were enrolled influenced in the knowledge about the dental prenatal care. Likewise, the female gender and lower workload were predictors of a higher degree of professionals' knowledge about the subject. Higher education institutions need to change the teaching-learning plan regarding the holistic dental approach for women during pregnancy.

DISCLOSURE STATEMENT

The authors declare no conflict of interests.

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TABLES

Table 1. Final model of multiple linear regression showing independent variables related to undergraduate students' knowledge about dental prenatal care

	Variables	Standardized Beta	t	p
Inicial model	Gender	-0.024	-0.257	0.797
	Type of university	-0.051	-0.543	0.588
	Period of the course	0.413	4.168	**< 0.0001**
	Scientific research/monitoring experience	-0.026	-0.274	0.785
	Participation in scientific events	0.011	0.110	0.913
	Constant	-	2.709	**0.008**
Final model	Period of the course	0.417	4.606	**< 0.0001**
	Constant	-	4.009	**< 0.0001**

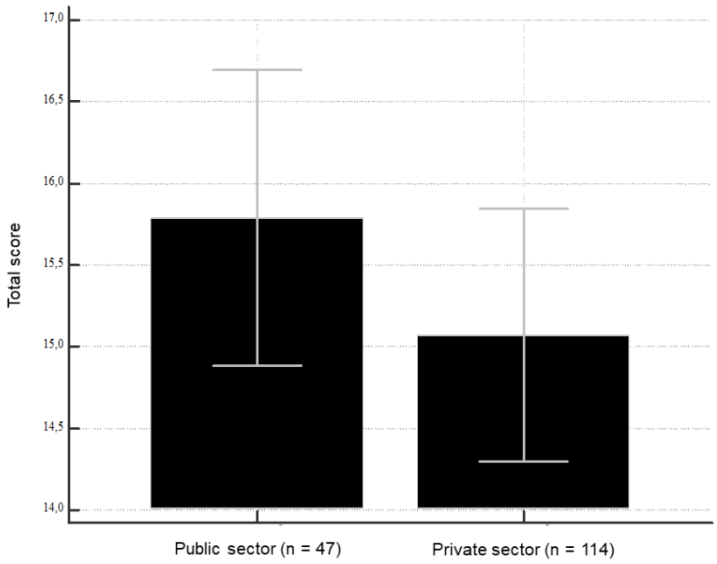
Table 2. Final model of multiple linear regression showing the independent variables related to the knowledge of professionals about dental prenatal care

	Variables	Standardized Beta	t	p
Initial model	Age	0.059	0.439	0.661
	Gender	0.140	2.113	**0.036**
	Time of experience in the profession	-0.030	-0.222	0.825
	Participation in scientific events	0.058	0.883	0.378
	Post-graduation	-0.110	-1.675	0.095
	Weekly workload	-0.226	-3.392	**0.001**
	Constant	-	17.372	**< 0.0001**
Final model	Gender	0.143	2.192	**0.029**
	Participation in scientific events	-0.107	-1.663	0.098
	Weekly workload	-0.216	-3.310	**0.001**
	Constant	-	20.986	**< 0.0001**

FIGURE LEGENDS

Figure 1. Comparison between professionals from the public and private health sector regarding to the total score of the questionnaire assessing knowledge about dental prenatal care ($p = 0.287$; t test).

Figure 2. Comparison between undergraduate and professionals regarding the total score of the questionnaire assessing knowledge about dental prenatal care ($p < 0.0001$; Mann-Whitney).



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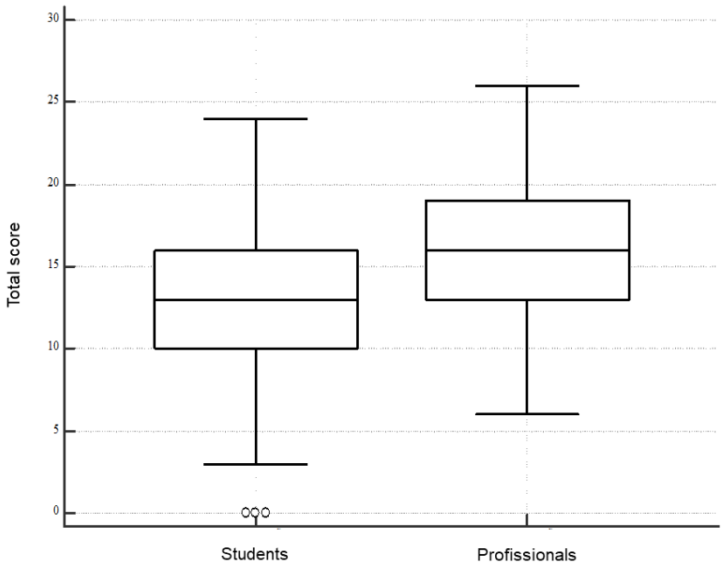

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