



Knowledge, Attitudes and Practices of Perinatal and Infant Oral Health among Healthcare Workers and Students of Medicine and Dentistry

Znanja, stavovi i praksa perinatalnog i infantilnog oralnog zdravlja među zdravstvenim radnicima i studentima medicine i stomatologije

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Abstract

A shared approach, coordination, and care for oral health as an integral part of general health should be imperative for every primary healthcare worker. The purpose of this study is to evaluate the knowledge, attitudes, and practices regarding perinatal and infantile oral health in different groups of health professionals in North Macedonia.

The survey was conducted from January 2020 to January 2021 with the distribution of an anonymous survey questionnaire electronically in the form of a Google Document to a different profile of healthcare professionals from primary healthcare in North Macedonia, as well as students of dentistry and medicine. The questions examined early childhood caries knowledge, attitudes about their role in preventing childhood oral health, and practices for promoting good oral health.

It was determined that 85.7 percent of doctors believed they need additional oral health education, 93.9 percent of respondents believed that they must educate parents/guardians about the importance of the preventive measures to maintain children's oral health and that they must advise parents in case of suspected caries to visit a dentist/pedodontist. Only 46.9% of respondents knew that cariogenic bacteria can be transmitted vertically from mother to newborn. A small percentage (26.5%) of respondents knew that white spots on baby teeth are early signs of caries.

A Guide to Perinatal and Infant's Oral Health for all health professionals who are in contact with a child in the first years of life would help to properly guide and educate parents in preserving infants' oral health.

Key words: Knowledge, Early Childhood Caries, Infant's Oral Health, Health workers

Apstrakt

Zajednički pristup, koordinacija i briga o oralnom zdravlju trebalo bi da bude imperativ svakog radnika primarne zdravstvene zaštite. Svrha ove studije je procena znanja, stavova i prakse u vezi sa perinatalnim i infantilnim oralnim zdravljem u različitim grupama zdravstvenih radnika u Makedoniji.

Anketa je sprovedena u periodu od januara 2020. do januara 2021. uz distribuciju anonimnog anketnog upitnika elektronskim putem, u formi Google dokumenta, različitim profilima zdravstvenih radnika iz primarne zdravstvene zaštite u Makedoniji, kao i studentima stomatologije i medicine. Pitanja su ispitivala znanje o karijesu ranog detinjstva, stavove o prevenciji dečijeg oralnog zdravlja i praksu za promovisanje dobrog oralnog zdravlja.

Utvrđeno je da 85.7% lekara smatra da im je potrebna dodatna edukacija o oralnom zdravlju, 93.9% ispitanika smatra da moraju da se edukuju o značaju preventivnih mera za očuvanje oralnog zdravlja dece, kao i da moraju savetovati roditelje u slučaju sumnje na karijes. Samo 46.9 % ispitanika znalo je da se kariogene bakterije mogu preneti vertikalno sa majke na novorođenče. Mali procenat (26.5%) ispitanika znao je da su bele mrlje na mlečnim zubima rani znaci karijesa.

Vodič za perinatalno i infantilno oralno zdravlje za sve zdravstvene radnike koji su u kontaktu sa detetom u prvim godinama života pomogao bi da se pravilno usmere i edukuju u očuvanju oralnog zdravlja odojčadi.

Ključne reči: znanje, karijes ranog detinjstva, infantilno oralno zdravlje, zdravstveni radnici



Introduction

“Dental caries” is an important public health problem and is the most common oral disease among children (1), which is five times more common than asthma and seven times more common than fever (2), affecting between 30% and 50% of children in high-income countries (3-6) and even 90% in low- and middle-income countries (7,8). According to the Global Burden of Disease Study (2016), 3.58 billion people in the world are affected by oral diseases, specifically caries of permanent teeth, which is the most prevalent of all other analyzed diseases and conditions. Globally, it is estimated that 2.4 billion people suffer from caries in permanent teeth and 486 million children suffer from caries in baby teeth (9). Early childhood caries (ECC) is the most common infectious disease and the greatest threat to oral health for infants and children according to the National Institutes of Health and the Centers for Disease Control and Prevention in America (10). According to the American Dental Association, early childhood caries is the presence of one or more carious (cavitated or non-cavitated) lesions, extracted or repaired tooth surfaces in the primary dentition in preschool children aged from birth to 71 months (11). Early childhood caries is considered a significant public health problem in both developed and developing countries with a prevalence of 1-12% and up to 70%, respectively (12). The same, if not treated, leads to the appearance of pain, swelling, infection in the oral cavity, which lead to difficulties in chewing, which in turn leads to a nutritional imbalance, which, together with changes in the child's behavior and sleep, lead to a reduced quality of life of the child, but also of the whole family. According to a report by the American Academy of Pediatrics, early childhood caries treatment costs Americans \$1,000–\$2,000 per child, an amount that people in low- and middle-income countries cannot afford. (LMICs) (13). Interventions targeted at mothers during pregnancy and at the infant in the first year after delivery have the potential to prevent the initiation and progression of caries in young children, thus reducing the development of this disease during life (14). According to the definition of the WHO, maternal health represents the health of the mother during pregnancy, childbirth, and the postpartum period, child health means health from birth to adolescence with a focus on the period up to five years of age, and the health of a newborn is the period from birth to the 28th day from life. According to Paglia L. (2019), the perinatal period is the period from the beginning of pregnancy to two months after birth (15). The perinatal period is a critical time when the determinants of health and oral health are established, and thus it is an important time for intervention (16). Since pregnancy is a specific period of a woman's life, when the probability of changing certain habits and behaviors related to her health and the health of the

unborn baby is high, pregnancy is an ideal time for the promotion of good oral health and proper nutrition and hygiene as a factor. for the same. These interventions can significantly change the trajectory of oral health for both the woman and her future child (17). In order to reduce the transmission of cariogenic bacteria (*Streptococcus mutans*), clinical and educational interventions should start during pregnancy. According to Plutzer & Spencer (2008), infant oral health education conducted during pregnancy, in pregnant women in their first pregnancy, is successful in reducing the rate of early childhood caries (ECC) (18). Creating interventions for mothers is especially important because mothers play a key role in taking care of their children's oral health (19). The American Academy of Pediatric Dentistry (AAPD) recognizes the care of infant oral health as one of the foundations on which education, prevention and dental care for oral health will be based, in order to provide the opportunity for a life free from preventable oral diseases (20). The initiative and application of preventive measures during infancy is significantly associated with the first visit to the dentist of the infant, which should take place in the 6th month immediately after the eruption of the first milk tooth, but no later than 12 months (21). According to previous research in the first year of the infant's life, the meeting with pediatricians is more frequent than with dentists. In developed countries there are regulations for the number of planned visits to a pediatrician in the first year. Thus, the American Academy of Pediatrics and the American National Initiative for Health Promotion and Prevention - Bright Futures (Bright Futures) have a guide that is based on evidence and according to it, at least 8 preventive pediatric appointments are recommended until the age of 12 months for the infant (22). Therefore, it is of crucial importance that pediatricians and family physicians recognize their role in the promotion of oral health in children by assessing the child's caries risk, conducting basic screenings for the early detection of dental diseases, educating parents and referring them to appropriate establishments (21). It is necessary for all health professionals who come into contact with women planning pregnancy or pregnant women as well as mothers of children to provide them with adequate and unified information and education to preserve and optimize oral health (17), especially at a time when the United Nations with the Global Strategy for the Health of Mothers, Children and Adolescents has a vision until 2030, for a world in which every woman, child, adolescent will exercise their rights to physical and mental health and well-being in every sense (23). Caring for the health of the mother and child also means taking care of oral health as an essential component of the overall health status of pregnant women, women in the reproductive period (24) and children.

The data show that in relation to the total population in North Macedonia, we have a sufficient num-

ber of dental, medical and pharmaceutical personnel and technical health workers. Dental care is provided in public and private healthcare facilities. In North Macedonia, after a ten-year implementation of the National Strategy for Oral Health among children aged 0-14, there is a significant reduction in the caries rate among 12-year-old children, but there are still no data on perinatal and infantile oral health. The research and scientific evidence on perinatal and infant health is needed, which will further serve as a base for health policy makers, for changes to the health system by applying perinatal and prenatal preventive interventions, with the aim of taking care of the oral health of the mother and the infant as an integrated part from their overall health.

The aim of the research is to evaluate the attitudes, practices and knowledge about perinatal and infantile oral health of all health professionals who come into contact with women planning pregnancy, pregnant women and mothers of children up to 1 year old.

Cilj istraživanja je da se ispituju navike žena zdravstvenih radnika u vezi sa zdravljem i prisustvo hroničnih bolesti u posmatranoj populaciji.

Methods

The research was conducted in the period from January 2020 to January 2021 by distributing an anonymous survey questionnaire electronically in the form of a Google Document to various profiles of health professionals from primary health care throughout the country, as well as to students of dentistry and medicine. The questionnaire was sent to 130 pediatricians, family medicine doctors and general doctors from private and state hospitals, private practices and health centers whose email addresses we reached through web research and were publicly available. All the other doctors from the first target group were excluded from the research, for whom only landline and mobile phone contact numbers were publicly available from personal data. Through the association of private gynecologists and obstetricians of North Macedonia, we sent the questionnaire to 120 gynecologists from the entire territory of our country. At the clinic for gynecology and obstetrics, at the children's state clinics and the health center, nurses and midwives were surveyed, live or electronically, and we did not find cooperation with the association of nurses of North Macedonia.

At the Faculty of Dentistry in Skopje, at the Department of Pediatric and Preventive Dentistry, students from the last years of their studies were surveyed, and medical students who were hired by the Ministry of Health at the height of the pandemic were surveyed electronically.

The questionnaire was based on questionnaires already used in scientific literature in the period 2012-2019 year (25-28), and had evaluated the level of

knowledge, attitudes and practices of the respondents through several questions. It is structured in several parts: 1) The first part contains demographic data; 2) The second part provides data on the level of education, sources of information on oral health and what is the respondents' need for additional education on oral health; 3) In the third part, the attitude of the respondents regarding their role in preserving the oral health of infants and young children is evaluated; 4) The fourth part shows what the respondents practice in their daily practice, with the aim of eradicating caries and oral diseases and raising the overall health to a higher quality level through oral health; 5) The fifth part is composed of questions that assess the level of knowledge about oral health in infancy and early childhood. The questions had the possibility of multiple answers, where the respondents considered it necessary. The answered questionnaires were entered into Microsoft Excel and summarization, simple mathematical processing and descriptive analysis of the data were done.

Results

Tables 1 and 2 show the demographic data for each group separately. The total number of healthcare professionals who responded to the questionnaire was 116, and we obtained a total of 117 responses from medical and dental students. The final number of respondents - pediatricians, family doctors and specialists in family medicine - who responded positively to the questionnaire is 49, i.e., 37.69% of the total number of respondents. In the second group surveyed out of approximately 120 gynecologists to whom the survey was sent, we received 31 responses (25.83%). We secured responses from a total of 36 nurses and midwives, 48 dental students and 69 responses from medical students. The number of females among the group of doctors and nurses is greater, so out of a total of 116 respondents, 98 are women (84.5%). The largest percentage of doctors and nurses are of age from 35-45 years old (35.3%), with work experience of 10-25 years (44%), work in a state hospital (45.6%) and on average examine 10-25 patients per day (48.3%) (Table 1). And among the students of medicine and dentistry, female respondents predominate, that is, 80.3% are female and 19.7% are male, out of a total of 117 respondents. Most of the respondents are in the fifth year of their studies and even 99.1% are studying at a state university in North Macedonia (table 2). We asked all respondents the question whether cariogenic bacteria are transmitted vertically from mother to child, in order to evaluate the level of knowledge about the etiology and development of early childhood caries as one of the most common diseases in children. Graph 1 shows the responses of each group of health professionals and students separately in North Macedonia (Table 2). Over 60% (61-65%) of nurses and

Table 1. Demographic data of pediatricians, family doctors, gynecologists, nurses and midwives

	Pediatricians, family doctors N 49	Gynecologists N 31	Nurses and midwives N 36	Total number of respondents N 116
Sex				
Male	5 (10.2%)	12 (38.7%)	1 (2.8%)	18 (15.5%)
Female	44 (9.8%)	19 (61.3%)	35 (97.2%)	98 (84.5%)
Age				
25-35	21 (42.9%)	7 (22.6%)	8 (22.2%)	36 (31%)
35-45	17 (34.7%)	7 (22.6%)	17 (47.2%)	41 (35.3%)
45-55.	5 (10.2%)	7 (22.6%)	5 (13.9%)	17 (14.7%)
Over 55	6 (12.2%)	10 (32.3%)	6 (16.7%)	22 (19%)
Years of working experience				
<5.	19 (38.8%)	3 (9.7%)	5 (13.9%)	27 (23.3%)
5-10	5 (10.2%)	7 (22.6%)	2 (5.8%)	14 (12%)
10-25	19 (38.8%)	11 (35.5%)	21 (58.3%)	51 (44%)
>25	6 (12.2%)	10 (32.3%)	8 (22.2%)	24 (20.7%)
Work in				
Private ordination.	18 (36.7%)	19 (61.3%)	5 (13.9%)	42 (36.2%)
Private hospital	5 (10.2%)	5 (16.1%)	8 (22.2%)	18 (15.5%)
State Hospital	22 (44.9%)	8 (25.8%)	23 (63.9%)	53 (45.6%)
Vaccination points	4 (8.2%)	0	0	4 (3.4%)
Number of patients examined per day on average				
<10	8 (16.3%)	3 (9.7%)	2 (5.8%)	13 (11.2%)
10-25	18 (36.7%)	20 (64.5%)	18 (52.9%)	56 (48.3%)
>25	23 (46.9%)	8 (25.8%)	14 (42.1%)	45 (38.7%)

Table 2. Demographic characteristics of students of medicine and dentistry

	Students of medicine N 69	Students of dentistry N 48	Total number of respondents N 117
Sex			
male	12(17.4%)	11(22.9%)	23(19.7%)
Female	57(82.6%)	37(77.1%)	94(80.3%)
Which year on studies you are			
4-th	26(37.7%)	4(8.3%)	30(25.8%)
5-th	16(23.2%)	31(64.6%)	47(40.2%)
6-th	17(24.6%)	1(2.1%)	18(15.2%)
Intern	10(14.5%)	12(25%)	22(18.8%)
Studying/Studied on			
Private university in North Macedonia	/	/	/
Private university outside of North Macedonia	/	1(2.1%)	1(0.9%)
State University in North Macedonia	69(100%)	47(97.9%)	116(99.1%)

midwives and medical students do not know that cariogenic bacteria are transmitted vertically from mother to child. Less than half of gynecologists (48%) and pediatricians, family doctors (47%) know about the vertical transmission of *Streptococcus mutans* (SM), and the percentage of dental students who answered this question correctly is 51% (Chart 1). We asked all healthcare professionals and students who would be

in a position to recognize the first signs of caries in early childhood, whether white spots on milk teeth are early signs of caries. 69.6% of medical students do not know that white spots are early signs of dental caries, only 26.5% of pediatricians, family doctors and family medicine doctors answered this question correctly, 41.7% of nurses said yes, and the largest is the percentage among dentistry students who know the

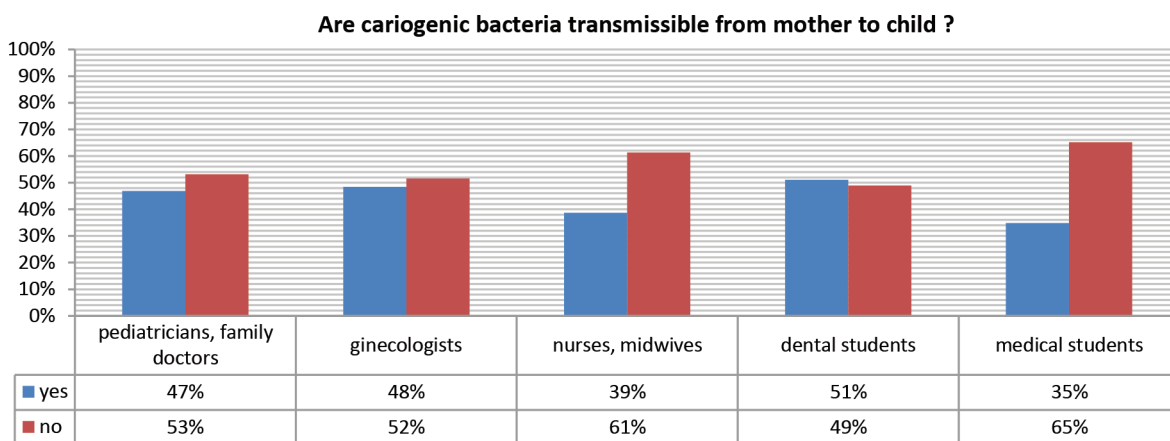


Figure 1. Evaluation of perinatal and infantile oral health knowledge among health professionals and students

correct answer to this question (70.8%). When asked which is the most cariogenic sugar in the diet, the following answers were offered: sucrose, glucose and lactose. 81.3% of dental students, 72.2% of nurses and midwives, 69.6% of medical students and 67.3% of the group of pediatricians, family doctors and specialists in family medicine chose the correct answer sucrose to answer this question. Wanting to evaluate the practices of the respondents in order to prevent infantile and children's oral health, we asked them a question, if they were asked for advice, from which moment they recommend to start cleaning the oral cavity. They were offered the following answers: 1. Immediately after delivery immediately after feeding the baby; 2. Immediately after the eruption of the first milk tooth; 3. After the eruption of multiple milk teeth; 4. When he has all his milk teeth; 5. After the age of 5 years. The largest percentage of dentistry students (43.8%) decided to choose the answer under number 1, that is, they recommend starting the cleaning immediately after giving birth, after feeding the baby. To this question, the largest percentage of pediatricians, family doctors and specialists in family medicine (46.9%) as well as medical students (40.6%) chose the answer under number 3, which means they have a practice of recommending to start cleaning the oral cavity after an eruption on multiple milk teeth. 36.1% of nurses and midwives recommend to start cleaning the oral cavity immediately after the eruption of the first milk tooth. Among the gynecologists, through three questions, we evaluated the practices regarding the preservation of the oral health of the mother and the future newborn. When asked if they recommend a dental examination before pregnancy to their patients who are planning pregnancy, 67.7% answered positively. 77.4% of them answered affirmatively to the question of whether you recommend a dental examination for your patients in the first trimester of pregnancy. Only 9.7% of gynecologists will recommend a pregnant woman to postpone dental treatment until after delivery, but as many as 83.3% of nurses and midwives will recommend a pregnant woman to postpone dental

treatment until after delivery. This question was also asked of medical and dental students. 88.4% of medical students and 75% of dental students would not recommend postponing dental treatment until after childbirth. We asked respondents whether they think it is safe to use vasoconstrictor local anesthetics during pregnancy and offered them two answer options: yes and no. 38.9% of nurses and midwives believe that it is safe, 77.4% of gynecologists believe that it is safe to use this type of anesthetics during pregnancy, as many as 43.5% of medical students answered no, and only 35.4% of dental students answered positively. Over 78% of each group of health professionals and students are of the opinion that the probability of gingival inflammation increases during pregnancy, and the highest percentage is among nurses and midwives (97.2%). When asked if the health workers who come into contact with the mother and her child must advise the parents in case of suspected caries and the infant/child to visit a dentist/pedodontist, 93.9% of pediatricians, family doctors and specialists in family medicine have a positive attitude. Dentistry students (89.6%), medicine students (92.8%) and nurses and midwives (97.2%) have a positive attitude on this issue. Exactly 77.8% of nurses are of the opinion that it is risky to take dental x-rays during pregnancy, 51.6% of gynecologists believe that there is no risk with dental radiographic during pregnancy. Medicine students (72.5%) and dentistry students (87.5%) are of the opinion that there is a risk in this diagnostic procedure.

Discussion

To the best of our knowledge, this is the first study in North Macedonia that examines the attitude, practices and knowledge about oral health in the perinatal and infantile period of health professionals and students of medicine and dentistry that are directly or indirectly involved in the realization of the National strategy for the prevention of oral diseases in children up to 14 years of

age. And in the world scientific database and literature, the number of studies that describe the attitude of this target group of respondents to perinatal and infantile oral health is raising rapidly these last years. In Geneva, the World Health Organization, through the programs for maternal, child and adolescent health, established a tool for improving maternal and infant health at the national and international level (13), and the antenatal care programs of the World Health Organization have a vision to give every mother and new born the necessary health services, providing a positive experience during pregnancy, everywhere in the world (29). The World Dental Federation (FDA), on the other hand, emphasizes the importance of integrating oral health into all health policies at the national and international level, in order to prevent the occurrence of oral diseases, by encouraging governments, stakeholders and decision makers to insert the promotion of oral health as an integral part of the general health policy (30). Through the preventive programs for the preservation of oral health, which will start with interventions much earlier, in the prenatal and perinatal period, the growth and development of the child in good oral health will be enabled, as an integral and essential part of general health. It was reported that 89% of children aged one year visited a pediatric or family doctor's clinic, and only 1.5% had a visit to a dentist during the same period (31). Precisely, because in the first year the meetings with family doctor, pediatrician, nurses and midwives are more frequent, we were motivated to do this study through which we will find out the attitudes, practices and the knowledge of this "first line" of health professionals. According to the American College of Obstetricians and Gynecologists (ACOG), a dental examination should be recommended to the pregnant woman during the first prenatal visit (19). According to ACOG and according to the FDA, the use of local anesthetics with a vasoconstrictor with the correct application techniques safe during pregnancy (32). In our study, 77.4% of gynecologists believe that it is safe to use this type of anesthetics during pregnancy, but only 35.4% of dental students answered positively. According to Anil S(2017), one of the mechanisms through which children can acquire cariogenic bacteria in the first two years of their life is direct transmission through the mother's saliva, especially in those mothers who share their utilities with the baby (33). According to Pinar AE(2018), the main source of *Streptococcus mutans* in children in the first 12-24 months is the mother, through vertical transmission through saliva, but it can also be transmitted horizontally from brothers, sisters and caregivers (34). Pregnancy and the neonatal period are important stages for identifying "at-risk" children and early maternal intervention can reduce the chance of early childhood caries (34). Health professionals and students of medicine and dentistry in North Macedonia have insufficient knowledge about this issue, if we take into account that from 49-65% respectively for each group answered that there is no vertical transmission

of cariogenic bacteria. (Chart 1). In the study by Gupta SK et al (2019) 26.15% of pediatricians answered that this cariogenic bacterium can be transmitted vertically from mother to child (26) and in the study by Alshunaiber R (2019) in Saudi Arabia, 64.4% did not answer this question correctly (28). In our study, as many as 93.7% of pediatricians, family physicians, and family medicine doctors believe that they must educate parents/guardians about the importance of preventive measures to preserve oral health in children, and that they must advise parents in case of suspected caries in the infant/child for a visit to a dentist/pedodontist, which is almost an approximate percentage compared to the study by Alshunaiber R et al (2019), in which 86.1% of the examined pediatricians and family doctors had a positive attitude to this issue (28). When asked whether pediatricians, family doctors, and family medicine doctors play an important role in the prevention of caries and the promotion of good oral health, 77.6% of the respondents, pediatricians and family doctors, answered positively, compared to the study done in Turkey by Sezer et al.(2013) where even 96.9% of respondents had a positive attitude to this issue (25). Ninety-one percent of our surveyed pediatricians and family doctors advise parents/caregivers about oral health, dental caries and regular dental check-ups, which is an excellent percentage compared to their Saudi counterparts, who according to Alshunaiber R et al, (2019) only 57.9% of the doctors had this practice (28). According to the AAPD (American Academy of Pediatric Dentistry), parents/guardians should be encouraged to take their child to the dentist for the first time no later than 12 months in order to perform the following interventions (35). Initially, first visit with opening of medical (for the infant) and dental (for the parent and for the infant) card, oral examination, education on correct oral hygiene appropriate for the age, treatment with fluoride if there is an indication (36). In our study, 89.8% of pediatricians know that the first appointment with a dentist should be up to one year, which does not coincide with the study of Hadjipanayis at el (2018), according to which 43% of pediatricians in Europe recommend a first visit to a dentist after the third year, and only 7 percent before the child turns one year old (37). According to Balaban R et al (2012), the percentage of those who recommended the first meeting with a pedodontist in the first year of life is 63.9% (38). According to Hadjipanayis A et al, twenty-four percent of respondents - doctors did not know that white spots on teeth are the first signs of caries³⁷, in contrast to our study in which even 73.5% of respondents - pediatricians did not that white spots on milk teeth are the first signs of an initial carious lesion.

Conclusion

The large percentage of those who do not know that cariogenic bacteria can be transmitted from a mother to a newborn or the large percentage of those who do not

know that the first meeting with a dentist should be immediately after the eruption of a ground tooth, in contrast to the positive attitude and practices regarding oral health among the respondents, may signal the need for additional education on the topic of prevention of oral

health in the perinatal period. An easily accessible guide and protocol for infant oral health intended for all health professionals who come into contact with the child in the first years of life would help anyone who has an active role to properly guide and educate parents.

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