

Effects of an Oral Health Education Program for Pregnant Women

By Dr. Lina M. Cardenas, Dr. Damon D. Ross

ABSTRACT

Purpose:

The purpose of this study was to evaluate the gain in knowledge of oral health after education to pregnant women on dental anticipatory guidance and to determine how much of this information pregnant women retain over time.

Methods:

The study consisted of 40 pregnant women. Inclusion criteria included: (1) between the ages of 21-40; (2) in 12-40th week of pregnancy; and (3) spoke English. During the first visit, all subjects were asked to complete a pre-test (24 questions), watch a ten minute presentation and complete the post-test (24 questions). During the second visit (4 weeks/1 month after the first visit), all subjects were asked to complete the follow-up test (24 questions).

Results:

All of the tests (pre, post and follow-up) were scored and used to determine the changes in knowledge of the pregnant women after the presentation. The mean age for all 40 pregnant women was 26.88 (SD±4.3) years and the mean number of weeks pregnant was 25.2 at the first visit. The mean overall correct scores for the pre-test was 12.9 (53.75%), post-test was 20.9 (87.08%) and follow-up test was 20.17 (84.05%). These overall scores show an improvement of 8 (33.33%, $p < 0.05$) questions correct from the first to second test, and a digression of 0.73 (3.08%) questions correct from the second to third test.

Conclusions:

These observations indicate that in this study population pregnant women's knowledge improved after a presentation on dental anticipatory guidance. These observations also indicate that after four weeks, pregnant women were able to retain most of the information, as only a slight digression in overall scores was noticed from the follow-up test to the post-test.



Dr. Lina M. Cardenas



Dr. Damon D. Ross

INTRODUCTION

In the United States, approximately 80% of all dental caries are found in 20-25% of our nation's children. Caries, leading to toothaches, are one of the top reasons children miss school, and it can also affect a child's growth, leading to malocclusion, pain, and can be life-threatening.¹ Dental caries is complex and multifactorial, and it often begins to develop during infancy.²⁻³ Infants begin to establish an oral environment that places them at risk for dental caries. *Streptococcus mutans*, *sobrinus* and *lactobacillus acidophilus* have been implicated as the principal bacteria responsible for the initiation of dental caries in humans. The initial acquisition of these bacteria was initially thought to happen once the teeth were present,⁴⁻⁵ however, more recent data suggest that cariogenic bacteria can be found as early as three months of age.⁶ Several studies have shown that mothers who have high levels of salivary streptococci *mutans* tend to have children who are infected with the bacteria at a young age and who develop a large number of carious lesions in the primary dentition.⁷⁻⁸ Mothers need to be educated on the transmissibility of these bacteria, as well as the importance of having good oral practices for themselves and for their infants and growing children.

Because caries is preventable, promoting early positive behaviors toward oral health care could also reduce the incidence of caries at the population level. Prevention of dental caries begins

at birth, even before birth, with expectant mother's behavior and knowledge of infant oral health care.⁹⁻¹⁰ To accomplish this, it is imperative to develop strategies/programs that educate expectant mothers on infant oral health and at the same time, positively change their attitudes/behaviors and help them retain the knowledge over time.¹¹ By taking advantage of the time in which women are more sensitive and highly motivated to learn (during

pregnancy), education on anticipatory guidance may be immersed and retained, leading to an improvement in infant oral health.

The American Academy of Pediatric Dentistry recently introduced guidelines on perinatal oral health care.¹² These guidelines suggest anticipatory guideline education to the mother about prevention of dental caries through diet, oral hygiene, fluoride and delay of colonization and professional oral health care. Many studies have looked at oral health services in pregnant women.¹³ There is a known relationship between maternal oral health and birth outcomes.¹⁴⁻¹⁶ Moreover, there is a relationship between maternal oral disease and the child's oral disease.^{8,17} Expectant or new mothers are more sensitive and highly motivated to learn about their care and their baby during pregnancy. Few studies have explored oral health education to pregnant women.¹⁸ Other studies have evaluated oral health education in mothers and children and effects in the child's dental caries.¹⁹ There are a limited numbers of studies, if any, which have documented the effect of educating pregnant women on dental anticipatory guidance and how much of this knowledge mothers retain over a period of time. However, there are data that state more educational and preventive programs are needed.²⁰⁻²¹ Therefore, implementing a program in which educational material on anticipatory guidance given to pregnant women may

positively affect their attitude, behavior and knowledge would ultimately translate into better oral health for the infant and growing child. Additionally, knowing the retention of this information by the mother would help establish how often these concepts need to be re-emphasized. Because during the nine months of pregnancy, women often make multiple visits to a prenatal care provider, such as an obstetrician/gynecologist, it would be beneficial to develop educational materials for maternal and child oral health care. These educational materials could be distributed among prenatal care clinics to educate mothers, especially those of underserved backgrounds due to their higher risk of oral disease.

The purpose of this study was two-fold: 1) To develop electronic educational material that can easily be presented to pregnant women to educate them on oral health care for themselves, as well as their infant and 2) to evaluate the immediate and long term retention of knowledge of this education program for pregnant women.

Materials and Methods

An initial sample size of 40 pregnant women was determined by assuming an initial test score of 50% (by chance) and a gain of knowledge of 15%. Therefore, with a power of 90%, a sample size of 30 would have been enough to detect such a difference. The sample was increased to 40 pregnant women to account for attrition of the sample and for validation of the education material. Inclusion criteria included 12-40 weeks pregnancy, age >21 and ability to communicate in English. University of Texas Health Science Center at San Antonio, Institutional Review Board approval was obtained prior to conducting the study. A sample of pregnant women was given information on the study, and the women were asked if they would be interested in participating in the study. The women who agreed to participate were then asked to sign a consent form prior to starting the study. After signing the consent form, a pre-test (consisting of 24 questions) was given. The women were not allowed to ask questions pertaining to the test. After answering all of the questions on the pre-test, a 10 minute PowerPoint® presentation was given in which women were allowed to ask questions. The

educational material was divided into three main topics: 1) maternal health during pregnancy; 2) infant oral health and 3) child's oral health. Once the PowerPoint presentation was complete, each pregnant woman in the study was then asked to complete the post-test (identical to the pre-test). While filling out the post-test, women were not allowed to ask any questions. After completing the post-test, both tests were graded and the results were discussed with the women. Explanations were also given to clarify why questions were answered incorrectly. The pre and post-tests were also divided into three sessions (maternal health during pregnancy, infant and child oral health), respectively. Special emphasis was placed on the infant child's oral health.

A focus group with the first five (5) subjects was assembled and used to evaluate the validity of the tests and to modify the presentation as needed.

A follow-up test (identical to the pre/post-tests) was then given after four (4) weeks. While filling out the follow-up test, women were not allowed to ask questions pertaining to the questions. The follow-up test was then graded and results discussed with the women. If the women had any questions, they were addressed during the discussion period. Basic statistical analyses, including frequencies, were applied to the sample to evaluate the gain and retention of knowledge in pregnant women after standardized educational material was presented.

Results

The age of pregnant women who participated in this study varied from 21-38 years (mean was 27) and the weeks of pregnancy ranged from 12-40 (mean was 25.2). There were 18 women who were in the age bracket of 21-25 years, 12 (26-30 years), 6 (31-35 years), and 4 (36-40 years) (**Figure 1**). Attrition of the sample resulted in 35 pregnant women presenting for the 1 month follow-up test. There were five (5) women who did not complete the follow-up test because their phone numbers were disconnected and they were unable to be contacted.

Data shows that of the 40 women studied, knowledge in all 40 (100%) improved from the pre-test to the post-test (which was given immediately after the

presentation). This immediate gain in knowledge went from a total score of 12.9 (53.75% correct answers) to 20.9 (87.08% correct answers) in post-testing, which was clinically and statistically significant ($p < 0.05$) (**Figure 2**). The average number of overall questions answered correctly for the follow-up test was 20.17 (84.05%).

In the pre-test the area of oral-health knowledge that displayed major deficiency (questions in which more than 75% of women missed) involved: effects of tetracycline/alcohol intake during pregnancy, non-nutritive habits including discontinuation of pacifier use and emergency management of dental trauma. Other areas in which subjects performed poorly (>50% <74% missed) during the pre-test included: transmission of bacteria, possible sequelae of untreated caries in children and formation of deciduous dentition.

In the post-test, none of the questions were missed more than 50% of the time. However, there were a few questions missed >25% <49% of the time, which included areas such as: effects of pre-term low birth weight, effects of taking tetracycline during pregnancy, exfoliation of deciduous teeth and emergency management of dental trauma.

In the follow-up test, given a month after the post-test, only one question was missed >50% <74%. This question dealt with the topic of discontinuation of pacifier use.

Questions in the follow-up test which were missed >25% <50% of the time included areas such as: effects of pregnancy gingivitis, effects of alcohol intake during pregnancy, timing of eruption of permanent teeth and emergency management of dental trauma.

Discussion

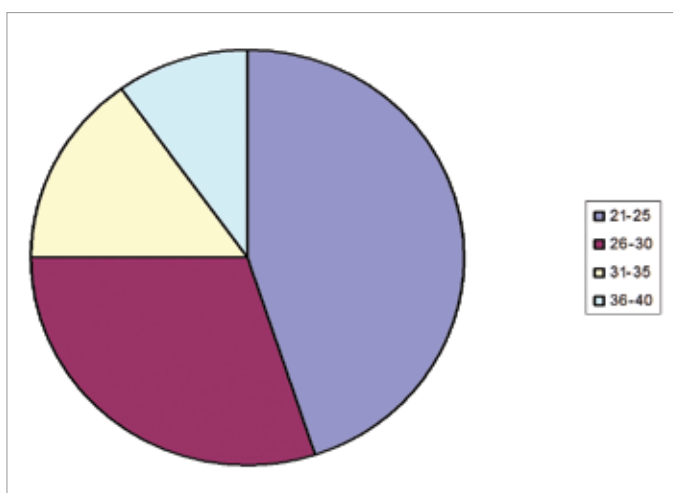
The Surgeon General's Report, "Oral Health in America," states that primary prevention of dental caries, as well as prevention of birth defects, should involve treating oral diseases in pregnant women and educating mothers to promote the birth of full-term babies.^{16, 21} Because studies have shown that periodontal diseases may be a significant risk factor for pre-term low birth-weight infants,²²⁻²³ it is important to stress good oral health in pregnant women. Low birth-weight babies are at higher risk of death during

the neonatal period and those who survive often face multiple developmental and behavioral problems. Therefore, improved education is extremely important in helping to prevent pre-term low birth-weight babies, as well as the overall health of infants. Educating pregnant women should include not only risk factors for low birth-weight, but also oral health education. These education measures help pregnant women understand the prevention of oral dental caries by reducing transmissibility of bacteria and other preventive measures.²⁴⁻²⁵

According to a study done on 734 low-income immigrant women in New York City, only 54% reported receiving information about oral health care during pregnancy from a dental or other health care worker. This suggests that much needs to be done to disseminate information about the importance of maternal oral health and oral health care during pregnancy.²⁶ Treatment of early childhood caries can be expensive, often requiring extensive restorative treatment and extraction of teeth at a very early age. Restorative treatment alone can cost \$2000, in addition to the cost for general anesthesia which can add another \$1000-\$6000.¹⁸ Therefore, education to pregnant women has oral health implications in addition to effect on oral health costs.

In this study, pre-test results showed that many pregnant women are not educated on oral health. These women often fail to realize that their behavior and attitude toward oral health during pregnancy can have an effect on their child's oral health. Many of these women did not know that their baby's teeth begin forming while they are pregnant. Results from the pre-test also proved that the subjects in this study did not understand the importance of deciduous teeth, the possible sequelae of untreated caries, when it is important to stop pacifier use, nor what to do in the case of trauma. All 40 women mentioned before the study that learning about oral health was something they were

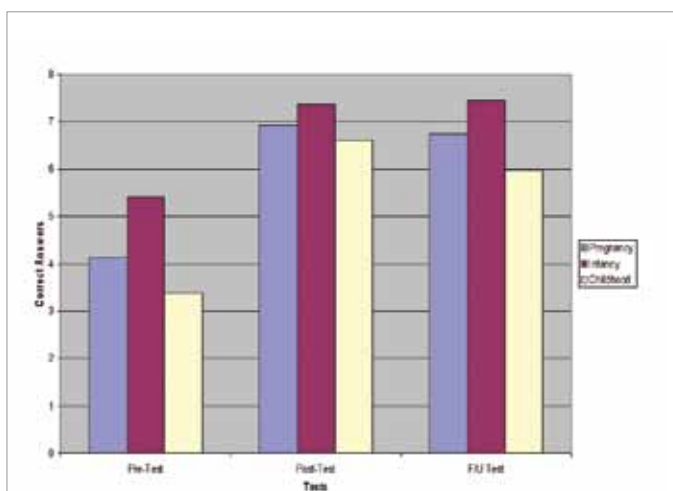
Figure 1 - Age distribution of studied subjects



interested in but were not afforded the opportunity. Although a few previous studies have investigated education programs to pregnant women,¹⁸ there are no data on the retention of this knowledge over time. This study investigated this issue and it was encouraging to see that these women retained most of the knowledge after one month. Most pregnancy follow-up appointments are performed on a monthly basis. Therefore, it is important to assess if this knowledge could be retained between follow-up appointments during pregnancy. A newly introduced concept of centering during pregnancy, where pregnant women (often of underserved backgrounds) gather for medical education and obstetrician/gynecologist check-ups, could be a helpful venue for oral health education.²⁷

The mean overall questions answered correctly for the pre-test was 53.75% and 87.08% for the post-test. This showed an average improvement of 33.33% which

Figure 2 - Average Scores per Test Category



demonstrates that the oral health education material was beneficial. The fact that none of the questions were missed >50% of the time suggested that the education material was effective. All of the women (100%) improved in overall score from pre-test to post-test. However, there were drastic improvements in women learning that baby teeth form during pregnancy, alcohol's association with cleft palate, transmissibility of bacteria, that untreated cavities could lead to death and how to manage dental trauma.


The mean overall questions answered correctly for the follow-up test was 84.05%. These results prove the presentation to be effective as there was only a slight reduction (3.08%) in retained knowledge one month after the presentation. There was only one question which more than 50% of the women missed. This question involved non-nutritive habits, specifically, discontinuation of pacifier use.

This study supports educating women on oral health during pregnancy. The American Academy of Pediatric Dentistry also emphasizes education to pregnant women in its newly introduced guidelines on perinatal care.¹² Moreover, results from this study showed that most pregnant women are not educated when it comes to oral health and they are willing to learn. These women are able to learn and they are also able to retain the information

presented to them for at least one month. Further studies should evaluate the retention of this knowledge over a longer period of time.

Conclusion

- All 40 women mentioned that they had not received any oral health education from their physicians (obstetrician/gynecologist) during their pregnancy.
- At completion of the presentation, all 40 women stated the information presented was very

- informative and helpful.
- Our data demonstrates an average of 34.67% improvement from pre-test to post-test with a slight decrease in average of 3.04% from post-test to follow-up test.
 - This study shows that educating pregnant women on oral health can be beneficial and that pregnant women are capable of retaining most of the information for at least one month.
 - Information on oral health should be included in education provided to pregnant women, especially for those of underserved backgrounds (who are at increased risk) through federal and/or state-based programs. 

Acknowledgements

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FIGURE LEGENDS

1. Ages of Subjects. Most patients were between the ages of 21 to 30 years old.
2. Average Scores Per Test Category. Note that there was a gain in knowledge in all the categories included in the educational material and the pre, post and follow-up tests respectively.

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Dr. Damon D. Ross is in private practice in San Antonio, TX.

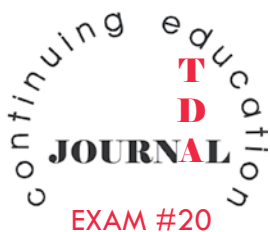
Dr. Lina M. Cardenas is Chair, Department of Pediatric Dentistry and Community Oral Health, University of Tennessee Health Science Center at Memphis.

Questions for Continuing Education Article - CE Exam #20

1. Pregnant women selected for this study were:
 - a. allowed to ask questions before the PowerPoint presentation
 - b. given a pre-test before the PowerPoint presentation
 - c. selected on basis of national origin
 - d. none of the above
2. One of the conclusions reached in this study was:
 - a. Pregnant women can't retain learned material
 - b. Pregnant women were able to retain most learned material
 - c. Pregnant women scored better than men
 - d. Caloric intake affected memory retention
3. In the United States 80% of caries are found in:
 - a. 50% of children
 - b. 20-25% of children
 - c. Geriatric patients
 - d. College students
4. Caries can:
 - a. affect a child's growth
 - b. cause pain
 - c. cause life-threatening situations
 - d. all the above
5. The post-test question missed most was regarding:
 - a. antibiotics
 - b. pregnancy gingivitis
 - c. use of alcohol by the mother
 - d. discontinuation of a pacifier

Answer Form for TDA CE Credit Exam #20: *Effects of an Oral Health Education Program for Pregnant Women*

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|----|---|---|---|---|
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| 2. | a | b | c | d |
| 3. | a | b | c | d |
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