

Review Article

Oral Health Education for Low-Income Pregnant Women; Findings of a Pilot Study

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Abstract

Purpose: Many pregnant women are afraid to seek dental care and do not realize the importance of dental care, and many have limited access to dental services. The purpose of our project was to determine the effect of a group educational intervention on the oral health beliefs (the belief that maintaining oral health is important and attainable) of low-income pregnant women.

Study Design and Method: A two-group quasi-experimental pretest-posttest design study was conducted using a convenience sample of 19 low-income pregnant women who were attending either an urban or rural breast feeding class. Women attended one class about oral health and completed the revised Oral Health Belief scale before and after the class. Likert data were treated as continuous data and analyzed by paired t-test.

Results: Oral Health Beliefs scores increased after attending the one class. Women at both sites combined had a change in oral health belief scores ($t = -7.945, p < 0.001$).

Clinical Implications: One teaching session improved oral health belief scores; even one brief class on oral health education can change women's beliefs.

Oral Health Education for Low-Income Pregnant Women; Findings of a Pilot Study

Hormonal changes during pregnancy may create an increased risk for dental caries, gingivitis and other dental problems [1]. Risk of dental related problems is high among low-income pregnant women who have limited access to resources such as dental care, dental counseling, and nutritional information [2]. The use of dental services by pregnant women was studied by Oh and colleagues [2] who found that only 42.1% of new mothers' in the Supplemental Nutrition Program for Women Infants and Children (WIC) saw a dentist during pregnancy and 62.6% of new mothers not enrolled in WIC saw a dentist [2]. Thus, all new mothers may have dental problems that were not treated during pregnancy and WIC mothers are the most likely mothers to have not seen a dentist. Dental problems can cause pain, lower quality of life, and jeopardize the health of the newborn [3]. Often many women believe that the pregnancy could be threatened by a dental procedure and avoid dental care to protect the pregnancy. Knowledge about the importance of good oral hygiene and dental care during pregnancy may be unknown to the mother [2].

The purpose of our oral health teaching project was to determine the effect of a group educational class on oral health in low-income pregnant women participating in the WIC breast feeding classes. The following question was used to evaluate the group educational intervention: Will group education intervention increase beliefs and knowledge about oral health in low income pregnant women? Our educational intervention project used a pre and posttest method to determine retention of knowledge and to capture whether or not beliefs about the importance of oral health care during pregnancy were changed. The educational session was a component of a regularly

scheduled breast feeding class at WIC.

Our project is a portion of a larger demonstration project funded by the W. J. Kellogg Foundation. The purpose of this larger demonstration project is to improve the oral health of low income pregnant women, mothers, and children who were enrolled in WIC (Supplemental Nutrition Program for Women, Infants, and Children). WIC is a national program that safeguards the health of low-income women, infants, and children through age 5 who are at nutritional risk by providing nutritious foods to supplement diets, counsel on healthy eating, and referrals to health care providers [4]. A School of Nursing and the Division of Nutrition and Dietetics at a Midwestern university collaborated with WIC on this interdisciplinary project. Educational and service relationships with local WIC sites in urban and rural locations had previously been established. A collaborative, interdisciplinary team worked together to provide oral health consultation to clients. WIC personnel continued with their usual duties. A Pediatric Nurse Practitioner (PNP) and Registered Dietitian (RD) were employed to implement the project at urban and rural WIC sites. Oral health assessments were implemented and fluoride varnish was applied to the teeth of WIC clients' children during a scheduled visit. Parents and children were provided education about oral health and referrals were made to establish dental homes.

Students from both nursing and nutrition disciplines (both undergraduate and graduate) were included in the project. The scope of practice was systematically expanded by training the RDs, PNPs, and RNs in applying fluoride varnish, in hopes of increasing knowledge of oral health in these disciplines and expansion of future dental capacity. This expansion of dental capacity may provide a measure to help relieve the current strain on dentists particularly in

under-served areas. Cross-disciplinary healthcare solutions provide a model for interdisciplinary work and offer opportunities for further collaboration in dental and other health needs. Especially important is the prevention and treatment of dental problems, and provision of individual counseling.

Review of the literature

Periodontal disease, a chronic bacterial infection of the tissue that supports the teeth, during pregnancy may increase the risk of adverse birth outcomes such as premature birth, low birth weight, still birth, miscarriage, and pre-eclampsia [5-8]. George et al. [9] meta-analysis of all up-to-date randomized control trials revealed dental treatment during pregnancy will improve periodontal health and reduce the risk of infants from developing early dental decay. Furthermore, George and colleagues deducted periodontal treatment during pregnancy is safe for both the woman and the fetus. However, finding ways to get pregnant women to obtain oral health care presents some challenges because few women receive oral health care during pregnancy.

Few obtain oral health care during pregnancy

Hwang et al. [10] studied the racial and ethnic influences on the oral health of 35,267 new mothers. Only 41% of the women actually received oral health counseling during pregnancy, indicating a need for education of all pregnant patients. Hwang et al. also found that the proportion of pregnant women who did not seek dental care, despite a dental problem, was greater in mothers who 1) had Medicaid than in mothers with private insurance, 2) who were in the lowest income bracket, 3) who were of Hispanic ethnicity, and 4) who were Black rather than White. Hwang et al.'s findings support those of Keirse and Plutzer who found that low-income women of all races do not see a dentist during pregnancy for similar reasons. Al-Habashneh et al. [11] found that only 35-50% of pregnant women visited the dentist during pregnancy. Keirse and Plutzer [1] related that most women did not recognize gingival bleeding as indicating inflammatory disease and viewed the oral health of their children as more important than their own oral health.

Oh et al. [2] reviewed data of 1,243 new mothers from Rhode Island, 617 of whom participated in WIC. Approximately 42% of WIC mothers saw a dentist during their pregnancy while 63% of mothers who did not participate in WIC saw a dentist. Almost 71% of women with an annual household income greater than \$50,000 sought dental care during pregnancy, and only 42.4% of women with an annual household income less than \$25,000 did so [2]. Significantly higher numbers of high-income women than low-income women sought oral health care. However, according to Buerlein, Horowitz, and Child [12], who conducted focus groups to identify the state of oral health of pregnant women and their offspring and factors related to obtaining oral health care during pregnancy, learned that 80% of tooth decay was found in 25% of the children from low-income background and that lack of insurance and cost of treatment were the primary barriers to obtaining oral health care. Therefore, targeting low-income families for oral health care information should improve oral health.

Barriers to Oral health care during pregnancy

Researchers who have studied oral health in pregnant women have identified barriers to dental care in this population. Ressler-

Meaerlender, Krishna and Robison (2005) [17] found that fear of treatment, myths about treatment, myths about pregnancy, lack of insurance, lack of money, and lack of provider availability were common barriers. Keirse and Plutzer (2010) [11] found that cost was the main barrier to seeking oral health care among 649 nulliparous women. Hwang, Smith, McCormick, and Barfield (2011) identified a barrier contributing to lack of provider availability: "only a small percentage of dentists in the U.S. accept Medicaid patients due to the low reimbursement fees and greater administrative workload. In 2000, the United States General Accounting Offices reported that of 39 states that provided information about dentists' participation in Medicaid, 23 reported that fewer than half of the states' dentists saw at least one Medicaid patient during 1999 (Hwang, Smith, McCormick and Barfield 2011[9].

Keirse and Plutzer (2010) [11] found that women first need to perceive oral health issues as health problems, even when the issues occur during pregnancy. Such perception appears to be lacking, representing a barrier, because nearly half of all pregnant women with dental problems sought no dental care or postponed care until after the birth. Acharya, Bhat and Acharya (2009) [1] clinically evaluated 259 pregnant women, 100% of whom had some degree of gingivitis and 84% of whom had dental caries; 14.2% of these women postponed dental treatments during pregnancy as well. Buerlein, Horowitz and Child's (2011) findings were similar: that most of the women in their study were unaware of the importance of oral health during preconception and pregnancy, but were motivated to implement recommended health behaviors provided the information was given to them early enough to apply during the pregnancy. But information may not be given to pregnant women early enough, or at all, because health care workers may be as uninformed about oral health care during pregnancy as patients are. Two studies examined Certified Nurse Midwives' (CNM's) understanding and knowledge about oral health in pregnancy. Both studies found that very few midwives addressed oral health with their patients and midwives had a lack of awareness of the relationship between oral health and adverse pregnancy outcomes (Wooten et al. 2011; George et al., 2011) [7,22]. Only half (49.7%) of the physicians in another study advised pregnant women to visit the dentist, leading the authors to conclude that physicians and other healthcare providers need to recommend dental visits when needed during pregnancy (Al-Habashneh, Aljundi and Alwaeli, 2008) [2].

Oral health education

Even though low-income pregnant women experience several barriers to dental care, education may motivate them to visit a dentist more frequently. According to Stevens, Iida and Ingersoll (2007) [20], low-income women often have better access to dental insurance during pregnancy than when not pregnant, so pregnancy provides a window of time to teach the women the importance of dental care. Plutzer and Keirse's (2011) [10] study of the effectiveness of an oral health promotion program for single mothers having their first child revealed that anticipatory guidance reduced the risk of Early Childhood Caries (ECC), but the overall risk was still higher than in single family, low-income homes.

Educating pregnant women through the use of brochures had a positive influence on seeking oral health care. Brochures were

distributed to 13 health care providers and 33 pregnant women. All of the caregivers who read the brochures expressed a desire to teach their clients about the importance of dental care. A large number of the pregnant women who read the brochures (81.8%) planned to seek dental treatment during their pregnancy and 42.4% of the pregnant women said that the brochure influenced their decision (Bush, Allen, Lindsey, Skeleton and 2006) [6] about seeking oral health care. Stevens, Iida and Ingersoll (2007) [20] noted that pregnancy is a critical time for patients to modify health behaviors and for providers to instill lifelong positive health practices for women and children.

In summary, a paucity of knowledge about the importance of oral health during pregnancy exists and high cost is a major barrier to obtaining dental care.

Theoretical framework

Our project was guided by the Health Belief Model (HBM). The HBM proposes that for people to be motivated to learn about a health issue or problem, they need a belief that they are at risk for developing the health problem (Rosenstock, Strecher and Becker 1988) [18]. People also need to believe that a change in behavior will lower that risk. For our project, the model indicates that low-income pregnant mothers need to be motivated to learn about oral health, and need to believe there is risk for themselves and for their infants. The mothers must believe that they have oral care needs during pregnancy and believe that proper oral health care will lower that risk. So, based on the HBM, low-income, pregnant mothers need to learn and understand their risks for developing dental problems and realize that dental problems may adversely affect both themselves and their babies' health. Low-income pregnant mothers need to believe that changes in behavior can reduce oral health risks. Therefore, the HBM guided the development of the group educational intervention and the development of the pre- and post-tests. The educational intervention was designed to motivate mothers to learn by creating the belief that they were at high risk for developing dental problems that could affect not only themselves but also their babies. The education intervention also conveyed to the participants that they could lower their risk for dental caries and periodontal disease by implementing preventative measures. We hypothesized that women who chose to participate in the project would improve their knowledge of oral health during pregnancy. The assumption was made that because the participants were ready to learn when they volunteered for the project, attainment of knowledge, seeking dental care, and practicing good dental hygiene would occur as a result of the education intervention.

Methods

Design and subjects

A two-group quasi-experimental pretest-posttest design guided the pilot to determine differences in the effect of the intervention (a classroom presentation about oral health during pregnancy) during one breastfeeding class between urban and rural county WIC participants. WIC asked the PI to present the same intervention to their clients in both sites. The study was approved by the university institutional review board and permission was also granted by WIC at the state level.

The 19 participants in the study (11 from the rural site and 8 from the urban site), were recruited using convenience sampling,

were pregnant women who received government assistance from WIC programs located in a Midwestern state and were attending breastfeeding classes offered by WIC. The participants were at least 18 years old and able to read the pretest and posttest questions. No participants were excluded based on ethnicity and all who wanted to participate were allowed to do so to obtain the largest sample size possible for the pilot when we realized a fully powered study would not be possible due to time constraints. The participants were informed that their decision to participate was voluntary and would not alter their eligibility for WIC services.

Intervention

Women participated in a teaching session which included possible outcomes of poor oral health, the importance of seeing a dental care provider, and instructions for prevention of caries and periodontitis. Before the intervention began, the participants were informed that no personal information would be collected, participation was voluntary and participation or nonparticipation would not affect their WIC benefits and participation in the study implied their consent.

The women who participated in the project completed a pretest and a posttest. The pretests and posttests were comprised of eleven questions from ICS-II Oral Health Belief Questionnaire which assessed their prior knowledge and beliefs about oral (dental) health including nutrition (Nakazono, Davidson, and Andersen, 1997) [13].

The convenience sample (n=19) was comprised of women from breastfeeding classes at the urban and rural WIC sites. The educational oral health intervention occurred at the breastfeeding class. Pregnant mothers attending the class received oral health teaching about the importance of dental care during pregnancy and lists of dentists in the area that accepted Medicaid and other insurance providers.

Instrument

The women's knowledge and beliefs of oral health were measured using 11 Likert questions about their beliefs about oral health extracted from the ICS-II Oral Health Belief Questionnaire (Nakazono, Davidson and Andersen, 1997) [13]. For example, the participants were asked if they strongly agree, agree, disagree, or strongly disagree with the statement "Tooth decay can make people look bad" (Nakazono, et al., 1997) [13]. The Likert values for the responses ranged from 1-4 and were treated as continuous data. Higher responses indicated higher levels of agreement. The women at both sites who participated in the project completed the same pretests and posttests. The pretest and posttest assessed their knowledge and beliefs about oral (dental) health as well as effects of nutrition on oral health (Nakazono et al. 1997) [13] and reflects the total of scores for all items at pretest and posttest. The 11-item scale has been used before (Di Marco, Ludington-Hoe and Menke 2010) [5] and has established reliability (.82) used with homeless women (DiMarco et al., 2010) [5].

Data analysis

Data were analyzed with SPSS Data Analyzing Software Version 17.0. Descriptive and paired sample t-test statistics were calculated. A mean and standard deviation for each item at each time (pretest and posttest) for each site was calculated prior to conducting a paired-t test for each item and total scale score.

Table 1: Overall test scores.

	Mean pretest score	Standard deviation	Mean posttest score	Standard deviation	2-tailed p-value
Rural (n=11)	31.63	3.72	40.45	4.56	<0.001
Urban (n=8)	29.37	5.45	41.87	4.45	.001
Combined (n=19)	30.68		41.05		<0.001

Table 2: Urban county results.

	2-tailed p-value	Pretest mean score	Posttest mean score	Abbreviated question
Question 2	.015	2.75	3.88	Affect work
Question 7	.049	3.13	3.75	Dentists available
Question 8	.049	2.63	3.88	Brushing with Fluoride
Question 9	.049	2.63	3.88	Drinking fluoride water
Question 10	.049	2.63	3.88	Fluoride prevents decay

Table 3: Rural county results.

	2-tailed p-value	Pretest mean score	Posttest mean score	Abbreviated question
Question 2	P= .014	2.55	3.73	Affect work
Question 3	P= .038	3.36	3.73	Cause other health problems
Question 4	P= .016	3.27	3.73	Value dental health
Question 7	P= .038	3.18	3.55	Dentists available
Question 9	P= .012	3.00	3.73	Drinking Fluoride water
Question 10	P= .004	3.00	3.73	Fluoride prevents decay
Question 11	P= .016	3.09	3.55	Sweet foods cause decay

Results

Subject characteristics: Although no identifying data were collected with the participants, the overall ethnicity of the rural and urban WIC sites were as follows: Urban county: 61.5% Black, 26.9% White, 3.8% Biracial, 7.7% Asian and Rural County: 27.9% Black, 66.3% White, 2.3% Biracial, 3.5% Asian.

Total score results

The mean pretest score for participants at the rural county was 31.63 (SD=3.72), indicating a preexisting knowledge of oral health. The mean posttest score for participants at the rural county was 40.45 (SD=4.56), suggesting improvement in oral health beliefs after the participants attended the teaching session. The mean pretest score for participants at the urban county was 29.37 (SD=5.45), indicating a preexisting knowledge of oral health. The mean posttest score for participants at the urban county was 41.87 (SD=4.45), indicating an increase in oral health beliefs. The overall, urban and rural combine, mean pretest score was 30.68 with a mean posttest score of 41.05 (p<0.001). The t-tests suggest that the educational session increased the participant’s knowledge about the importance of oral health during pregnancy. Women at both sites (n=19) combined had a change in oral health belief scores (t= -7.945, p<0.001). Women at the rural county site (n=11) had greater change in oral belief scores (t= -6.298, p<0.001) over the urban county site (n=8) (t= -5.365, p=.001) (Table 1).

Overall question results

When examining the individual question scores for combined rural and urban (n=19), there were only three questions that were not significant, Question 1) Tooth Decay can make people look bad, 5)

Dental disease is as important as other health problems, and 6) I am not afraid of dental visits because of possible pain.

Individual question results comparing rural vs urban

When descriptively analyzing item scores, several increases in oral health beliefs were present for both urban and rural participants: increase in knowledge regarding the affects of poor teeth on work and everyday life (question 2), the availability of dentists for dental problems (question 7), and the benefits and harmlessness of fluoride for preventing tooth decay (questions 9 and 10).

These results are demonstrated in the table 2 and 3 showing the two-tailed p-values as well as the pre-test mean score and post-test mean score for each question. Each county is represented by table 2 and 3. The two-tailed p-values < .05 indicated the significance in the increased post-test scores for that particular question.

Conversely, the counties shared a common lack of learning in two questions. Neither county showed an increase in knowledge regarding the belief that tooth decay can make people look bad (question 1). They also showed no increase in knowledge regarding fear of dental visits due to possible pain (question 6).

For the urban county, the participants also showed no increased in knowledge in six of the eleven questions tested. Learning was not observed in subjects regarding the belief that dental problems can cause other health problems (question 3), they greatly value their dental health (question 4), dental disease is as important as other health problems (question 5), and eating sweet food causes tooth decay (question 6) (Table 4).

In contrast, the rural county showed no increase in knowledge in

Table 4: Urban county results.

	2-tailed p-value	Pretest mean score	Posttest mean score	Abbreviated question
Question 1	.140	3.25	3.88	Decay- look bad
Question 3	.087	3.00	3.88	Cause other health problems
Question 4	.140	3.25	3.88	Value dental health
Question 5	.197	3.50	3.88	Dental Disease important
Question 6	.217	2.88	3.50	No Fear of Pain
Question 11	.080	3.25	3.68	Sweet foods cause decay

Table 5: Rural county results.

	2-tailed p-value	Pretest mean score	Posttest mean score	Abbreviated question
Question 1	.553	3.64	3.82	Decay looks bad
Question 6	.506	3.36	3.55	No Fear of Pain
Question 8	.052	3.18	3.73	Brushing with Fluoride

three of the eleven subjects tested. The only additional subject with no learning observed in addition to the shared subjects with the rural county was the belief that brushing teeth with fluoride toothpaste helps prevent tooth decay (question 8). These results are demonstrated in the table 5 showing the two-tailed p-values as well as the pre-test mean score and post-test mean score for each question. The county is represented by table 4. The two-tailed p-values > .05 indicated the lack of an increase in knowledge for that particular question.

The results in the tables show that the pretest mean score increased in the posttest mean score for every question in each of the counties. This indicates some level of learning for each question.

Discussion

An oral health education class was administered to 19 pregnant WIC clients while attending a breastfeeding class in two WIC centers, one in an urban area and the other in a rural area so all WIC clients would receive the same information and benefit from the same intervention. Paired t-tests between the urban and rural participants' total scale score showed; rural site participants had an increase in several items reflecting their knowledge and belief while urban site participants had few increases. Rural participants had an increase in knowledge and beliefs regarding the effects of oral health on their everyday life, the effects of oral health on their overall health, learned that dentists are available to them, and placed greater value on their oral health. Urban participants also learned that drinking fluoridated water prevents tooth decay and has no negative effects on their health, as well as learning that consuming sweet foods can cause tooth decay. The change in oral health knowledge/beliefs among the rural participants may be attributed in part to their preexisting knowledge about oral health and in part to the intervention. Urban participants did not change as much on the individual questions as a result of the intervention and may be attributed in part to their preexisting knowledge about oral health but we must also consider the smaller sample size at the urban site compared to the rural site. When examining the means of both sites, there was actually more of a change in overall mean in the urban site than the rural site but because of the smaller sample size, the urban site showed less significance.

Two issues about dental care were raised as a result of the study. First, access to dental services was perceived as being low among the all participants. According to Oh and colleagues (2011) [14], pregnant

women who participate in WIC are less likely to visit a dentist during their pregnancy than pregnant women who do not participate in WIC. Our findings indicate that fifteen out of nineteen participants at Portage and Summit County WIC perceived limited access to dental care on the pretest. After completing the teaching session, eight participants felt that dentists were more available to them, and 11 participants did not. Perceived lack of availability of a dentist clearly serves as a barrier to seeking dental care (Oh, et. al, 2011; Ressler-Maerlender, Krishna and Robison, 2005; Hwang, Smith, McCormich, and Barfield, 2010; Buerlein, Horowitz, and Child, 2011; Keirse and Plutzer, 2010). [3,9,11,14,17].

Eleven of the nineteen participants indicated that they had some fear of dental pain before completing the teaching session. After learning about methods of pain control seven participants indicated that they had less fear of pain two participants showed an increase in the fear of pain, and ten participants showed no change in knowledge of dental pain. Perhaps the explanation is that pain is preconceived by the individual person and possibly would not change with an intervention.

The lack of learning that occurred for participants in certain subjects may be related to preexisting knowledge/attitudes about oral health. Mothers views in both counties did not change on tooth decay can make people look bad and I am not afraid of dental visits because of possible pain. These questions are more subjective and probably would remain unchanged after teaching.

Limitations of the study: The limitations of the study were the small sample size and the time limits of the teaching sessions. Due to these limitations, the results of our pilot study cannot be generalized and further study with a sample size providing adequate power is needed.

Clinical implications: Information about fluoride varnishing, oral health assessments, anticipatory guidance about oral health of both mother and child, and dental referrals aimed at mothers with children constituted the information provided in the oral health class. The pretest scores indicated a need for oral health education in the studied population, supporting findings of others.

The participants in the rural county WIC site showed a greater improvement in oral health belief versus the participants at urban county WIC site and had a significant increase in knowledge on

almost every area tested on the pretest and posttest. But this was in part due to the lower sample size in the urban site (n=8) compared to the rural site (n=11). Both counties showed an overall improvement of scores.

This teaching intervention supported the purpose of the overall grant. Fluoride varnishing, oral health assessments, anticipatory guidance about oral health of both mother and child, and dental referrals were aimed at mothers with children. This teaching session added to the value of the one-on-one discussions. Pregnant mothers attending WIC and breastfeeding classes not only received oral health teaching and the importance of dental care during pregnancy, they also received lists of dentists in the area that accepted Medicaid and various other insurances.

The results from our study as well as the research identified within the literature review support the need for including oral health education for pregnant women. Given the large number of women who do not have their teeth cleaned or have their oral health needs addressed during the pregnancy, and the implications this has for morbidity and mortality on the infant, a simple oral health class could help increase the mother's knowledge in this area. Accompanied by an understanding of the implications for the health of the mother and newborn, the need for maternity care providers to address this issue is apparent. Keirse and Plutzer (2010) [11] make it clear that if preconception dental care is to be increased with pregnant mothers, it should be advocated by maternity care providers and stressed in antenatal clinics, pre-pregnancy counseling, and education sessions for pregnant mothers.

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