

Design, Implementation, and Evaluation of Educational Program in Oral Health for Midwives and Other Antenatal Care Providers in Iran

Abstract

Background: Maintaining oral health during pregnancy has been considered an essential public health issue worldwide. One of the various preventive strategies is to train antenatal care providers to guide pregnant women. This study aimed to design, implement, and evaluate an educational program's effect on the oral health-related knowledge, attitudes, and practice of antenatal care providers in Iran. **Materials and Methods:** All of the antenatal care providers working at Isfahan health centers were invited for this study in April 2019. A total of 340 volunteers (120 midwives and 220 others) finally participated in this interventional study with a pre-test–post-test design. A questionnaire was developed to assess the participants' knowledge, attitudes, and practice before and after the intervention. A lecture-based educational session containing similar issues asked in the questionnaire was held for all the participants. The participant's total knowledge scores before and after the intervention, and their attitudes and practice were evaluated and compared through paired t-test. **Results:** The participants' mean total knowledge scores before and after the intervention were 42.87 and 52.25, respectively. The paired t-test revealed a statistically significant difference between pre- and post-intervention scores ($p < 0.001$). The frequency of participants' answers to attitude and practice questions was also determined. **Conclusions:** Improving oral health-related knowledge of antenatal care providers can be achieved through a single educational session designed by accurately assessing their needs. The participants' attitudes revealed barriers to seeking dental care by pregnant women; however, the participants' oral health-related practice was acceptable.

Keywords: Prenatal Care, oral health, pregnant women

Introduction

Maintaining oral health during pregnancy has been considered an essential public health issue worldwide.^[1] Shifts in hormonal, immunologic, and vascular functions that accompany pregnancy might result in oral health problems, such as gingival inflammation and periodontal disease.^[2] Pre-term birth, preeclampsia, and delivery of a small-for-gestational-age infant have been correlated to maternal periodontal disease, i.e., a chronic infection of the gingiva and tooth-supporting structures.^[3] In addition, research suggests that high levels of cariogenic bacteria in mothers can lead to increased dental caries in the infant.^[4] A history of cavities or active caries in mothers is a predictor for Early Childhood Caries (ECC), the most common chronic disease in children.^[5] Mothers with untreated dental caries and higher level of salivary cariogenic bacteria

will transmit the bacteria to their children through inappropriate feeding habits, which might increase early caries risk in children. In addition, children's dietary and oral hygiene behaviors rely on parents or caregivers' oral health knowledge, beliefs, and behaviors.^[6] Furthermore, dental caries can cause adverse consequences during pregnancy and after delivery due to medication needs and changes in quality of life.^[7-9]

It is now recommended that all women should undergo a comprehensive oral health evaluation and risk assessment during pregnancy.^[1] In recent years, policymakers from various developed countries have acknowledged the concerns raised in the literature about the potential impact of poor maternal oral health, leading to various preventive strategies during this period. One of these strategies' main features has been

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the role of non-dental professionals, such as nurses and midwives, in promoting oral health during pregnancy.^[10,11] The close relationship between antenatal care providers and pregnant women provides a unique opportunity to motivate and change women's oral health practices. It is now recommended that all antenatal care providers offer oral health education, assessment, and referrals to women early in their pregnancy.^[1]

In Iran, the Ministry of Health has planned to engage antenatal care providers and midwives in designed programs for improving people's health-related information and practices.^[12] For instance, Isfahan has two main health centers with divisions in different parts of the city that provide primary health care for people. These centers have recruited midwives and other antenatal healthcare providers to screen and evaluate pregnant women's health status. Health centers hold educational sessions bi-monthly to re-train their staff and re-evaluate their knowledge. However, studies have shown limited knowledge of antenatal care providers about oral health during pregnancy, revealing the need to incorporate oral health training for midwives.^[13-16] Particularly in Iran, previous studies have found that midwives' attitudes and knowledge about oral health and its influence on systemic health were insufficient.^[16,17]

To the best of our knowledge, no previous study has designed, implemented, and evaluated an educational session based on accurate needs assessment of antenatal care providers. Thus, this study aimed to design, implement, and evaluate an education program's effectiveness on the oral health-related knowledge, attitudes, and practice of midwives and other antenatal care providers in Iran based on needs assessment and expert opinions.

Materials and Methods

Isfahan city has two main health centers with divisions in different parts of the city that provide primary health care for people. The first health center has 23 divisions, and the second center has 20 divisions. All of the midwives and antenatal care providers recruited in these centers and With a two-sided alpha risk of 0.05, a sample size of 360 participants was required, their divisions were invited to participate in this experimental observational study. A total of 360 midwives and antenatal healthcare providers participated in this interventional study in April 2019 through March 2020. Ethical approval was obtained on 19-02-2020.

Initially, a questionnaire on maternal/child oral health during pregnancy was developed by an expert panel consisting of two pediatric dentists, three midwives, and a dental public health professor. The procedure of developing the questionnaire will be discussed further. As a pilot study, 40 antenatal care providers were asked to complete the questionnaire. The answers were evaluated by the panelists,

and the main areas of needs for designing the content of the educational intervention were revealed. In addition, the questionnaire was revised based on the content that was to be educated. The face and content validity of the questionnaire were confirmed after revising the questions according to the experts' opinions. The panelists also discussed the priority of issues to be incorporated in the educational session. Finally, they selected 11 areas related to oral health for incorporating in the educational session. However, the time allocated to different areas of need differed based on their priority designated by the panelists. After that, the content of the designed educational intervention (and the revised questionnaire) was categorized into 11 subgroups as follows: 1. Importance of primary teeth and mother/child oral hygiene (three questions); 2. Transmission of cariogenic bacteria (two questions); 3. Dental radiography in pregnancy (one question); 4. Fluoride in pregnancy and childhood (three questions); 5. Mother and child feeding practice (four questions); 6. Infant dental examination (one question); 7. Vomiting and nausea in pregnancy (three questions); 8. Dental treatment in pregnancy (four questions); 9. How pregnancy affects the mother and child health (four questions); 10. Xylitol chewing gums in pregnancy (one question); and 11. Iron drops (one question).

A pre-test–post-test design was used to evaluate the efficacy of the educational intervention. Two health centers in Isfahan were included in this study. These centers have divisions in different parts of the city. Educational programs related to the care of pregnant mothers are regularly held at these centers for antenatal care providers. However, the program related to oral health of mother and child, designed by experts based on needs assessment, has not been implemented yet. In both centers, all the staffs were invited to participate in the educational session. Finally, 360 participants were included in this study. The participants were randomly divided into three groups ($n = 120$) to attend the 3-hour lecture-based educational program held simultaneously for all three groups by three calibrated professors. All the lecturers used the same educational package for their presentation. The lectures contained various information on mother/child oral health, which were similar to the topics asked in the questionnaire.

The pre/post-questionnaire was developed based on the content of the educational session. A total of 27 knowledge (true, false), four attitude, and five practice items were included in the questionnaire. Five-point Likert scale ranging from “strongly disagree” to “strongly agree” and from “always do” to “never do” was used to answer the attitude and practice questions, respectively.

A pre-questionnaire (in hard copy) was used to assess the participants' prior knowledge, attitudes, and practice toward perinatal oral health care and collect demographics such

as age, sex, and the number of children. Two weeks after completion of the educational program, post-questionnaires containing the same 27 knowledge items, as the pre-test, were distributed and answered by the participants to assess the educational program's immediate effect.

The data were analyzed using SPSS (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). The participants' knowledge scores were determined by giving +2 points to each correctly and 0 point to each incorrectly responded question. The answer to each question was then categorized according to whether the participant "completely agreed" or "agreed" with the correct answer/"completely disagreed" or "disagreed" with the wrong answer. Thereafter, the total score of the participants was calculated. The participants' mean total scores before and after the intervention were evaluated and compared through parametric tests. The participants' mean knowledge subgroup scores were assessed and compared before and after intervention through paired t-test. The frequency of the selected items for knowledge, practice, and attitude questions was determined and reported.

Ethical considerations

Ethics committee approval was obtained from the Isfahan University of Medical Sciences (IR.MUI.RESEARCH.REC.1398.670). Participation was voluntary, and the privacy and confidentiality of all the study information were maintained. Consent for participation and publication of the research findings was obtained from all the participants.

Results

A total of 120 midwives and 220 other antenatal healthcare providers with the mean (SD) age of 40.48 (7.51) participated in this study. The dropout rate was 5.50% since 20 questionnaires were not answered thoroughly; 94.61% of the participants were women, and 20.79% did not have a child.

The mean (SD) of the total knowledge score of the participants before the intervention was 42.87 (3.11).

There was no statistically significant difference between the midwives' mean knowledge score and other antenatal care providers before and after the intervention ($p > 0.05$). Independent t-test showed no statistically significant relationship between the number of children in the family and the participants' mean knowledge score. Furthermore, there was no significant relationship between toothbrushing and dental flossing frequency and total mean scores of participants' knowledge ($p > 0.05$). However, more than half of the participants carried out toothbrushing and flossing at least once a day.

The mean (SD) total knowledge score of the participants after the intervention was 52.25 (2.91). Paired t-test revealed a significant difference between pre- and post-intervention scores ($p < 0.001$). Figure 1 presents the frequencies of each knowledge question's selected items at pre- and post-intervention stages. At baseline, the participants' oral health-related knowledge on all the questions, except one, was moderate to high. Twenty-six knowledge questions were answered correctly by more than 50% of the participants before the intervention. The only item with a low percentage of correct answers among the participants was about xylitol-containing chewing gums. Less than 30% of the participants knew that chewing these gums by pregnant women might decrease the transmission of bacteria from mothers' to infant's mouth, and nearly 50% of them never encouraged pregnant women to chew these gums. Thus, the highest increase in the percentage of correct answers after the intervention was found in this issue's knowledge question.

The questions were categorized into 11 subgroups, and the participants' mean knowledge scores for each subgroup before and after the intervention were obtained. Table 1 shows the details of this assessment. A significant improvement in the participants' knowledge was found in all the evaluated subgroups ($p < 0.05$). However, due to the different number of questions in subgroups, inter-subgroup comparisons were not possible.

Overall, 89.61% of the participants believed that pregnant women did not visit dentists due to dental treatments'

Table 1: Comparison of knowledge scores of the participants before and after intervention based on subgroups

	Pre-intervention Mean (SD)	Post-intervention Mean (SD)
1.Importance of primary teeth*	8.08 (0.96)	8.58 (0.85)
2.Transmission of cariogenic bacteria*	3.39 (0.62)	3.93 (0.27)
3.Dental radiography in pregnancy*	2.35 (1.17)	3.47 (1.43)
4.Fluoride in pregnancy and childhood*	4.49 (0.88)	5.55 (0.63)
5.Mother and child feeding practice*	7.42 (0.80)	7.86 (0.41)
6.baby dental examination*	1.29 (0.68)	2.00 (0.98)
7.Vomiting and nausea in pregnancy*	4.87 (0.75)	5.79 (0.44)
8.Dental treatment in pregnancy*	6.09 (1.00)	10.12 (1.35)
9.How pregnancy affects the mother and child health*	6.55 (0.97)	7.63 (0.63)
10.Xylitol chewing gums in pregnancy*	1.31 (0.45)	1.94 (0.23)
11.Iron drops*	1.58 (0.49)	1.91 (0.28)

*There is statistically significant difference between pre- and post-intervention scores. ($p < 0.001$) (paired t-test)

costs, and 72.22% of the participants believed that pregnant women did not know the importance of visiting dentists. Only approximately 60.31% of the participants reported their disagreement with the risks of dental treatments during pregnancy, and >50% thought that dentists avoided treating pregnant women. Table 2 presents the frequencies of the selected answers based on four attitude questions.

As it was expected based on knowledge scores, the least common practice among participants was the recommendation of chewing xylitol-containing gums by pregnant women. However, approximately 80% of the participants always recommended a pregnant woman to visit dentists regularly and brush their teeth. Besides, >90% of the participants warned pregnant women about poor oral hygiene complications

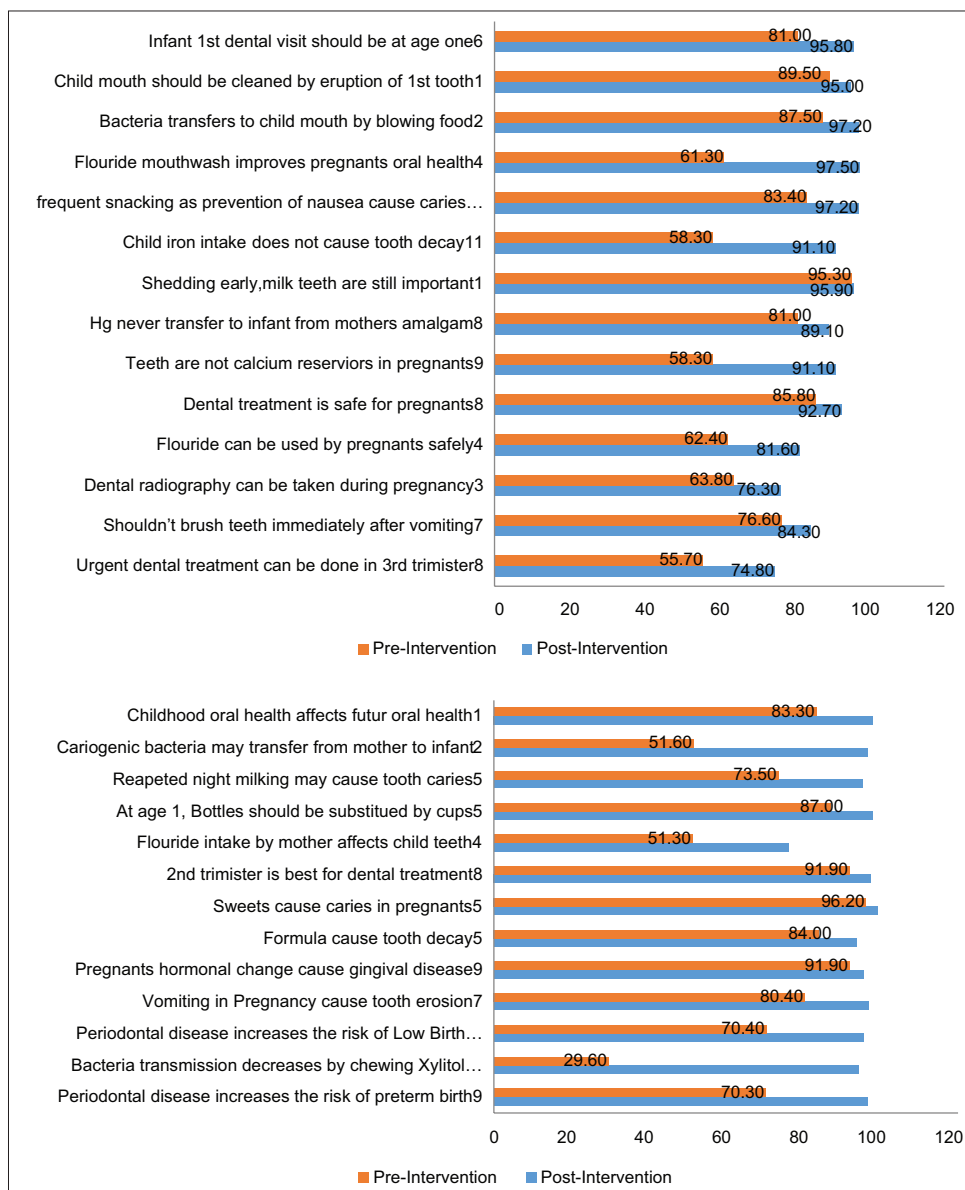


Figure 1: Percentage of participants with correct answer selection based on 27 knowledge questions (pre- and post-intervention)

Table 2: Frequency distribution of the participants' answers to each attitude question (n=360)

	Completely agree n (%)	Agree n (%)	No idea n (%)	Disagree n (%)	Completely disagree n (%)
Dentists do not treat pregnant women	32 (9.41)	98 (28.82)	42 (12.35)	135 (39.70)	33 (9.70)
Pregnant women do not go to dentist since they don't know the importance	47 (13.82)	200 (58.82)	32 (9.41)	56 (16.47)	5 (1.47)
Pregnant women do not go to dentist since the treatments are expensive	153 (45.00)	151 (44.41)	13 (3.82)	18 (5.29)	5 (1.47)
I think dental treatments during pregnancy are not safe	8 (2.35)	74 (21.76)	51 (15.00)	160 (47.05)	47 (13.82)

Table 3: Frequency of the participants' answers to each practice question (n=360)

	I always do n (%)	I often do n (%)	I sometimes do n (%)	I seldom do n (%)	I never do n (%)
I recommend pregnant women to visit dentist	287 (84.41)	32 (9.41)	8 (2.35)	6 (1.76)	7 (2.05)
I warn the pregnant women about problems that may cause by poor oral hygiene	246 (72.35)	71 (20.80)	13 (3.82)	8 (2.35)	2 (0.58)
If pregnant women complain of oral problems I examine their mouth	150 (44.11)	92 (27.05)	29 (8.29)	49 (14.41)	20 (5.80)
I recommend pregnant women to chew xylitol containing gums	38 (11.17)	35 (10.29)	35 (10.29)	71 (20.88)	161 (47.35)
I recommend pregnant women to brush their teeth and floss regularly	271 (79.70)	49 (14.41)	7 (2.05)	9 (2.64)	4 (1.17)

during pregnancy. Table 3 presents the frequencies of selected answers based on five practice questions.

Discussion

This study evaluated the effect of an educational intervention on oral health knowledge among midwives and other antenatal healthcare providers. Further, the baseline attitudes and practice of the participants were also assessed.

The World Health Organization has recommended that oral health be incorporated into comprehensive general health-promoting strategies and practices, requiring multi-professional collaboration and oral health promotion within healthcare practices of different health professionals.^[18] It is imperative to implement comprehensive approaches to promote oral healthcare by public health systems and tackle this problem.

In the current study, the results revealed that even a single session of a lecture-based educational program enhanced the total and subgroup scores of the oral health-related knowledge of midwives and antenatal healthcare providers significantly. In a previous study, an online midwifery-initiated oral health education program was developed, and its effectiveness in improving oral health knowledge of midwives was revealed.^[19] Furthermore, in another study conducted in Turkey, after an educational program, a significant improvement was found in oral health-related knowledge of midwives.^[20] This international focus on midwives supports the view that midwives, as the providers of most maternity services, are a key target group to educate and train in oral health promotion during pregnancy.

To the best of our knowledge, this is the first study in Iran that aimed to design, implement, and evaluate the efficacy of an educational program in promoting oral health-related knowledge of midwives and other antenatal care providers based on their initial needs. However, a few previous studies have assessed the knowledge and attitudes of midwives toward oral health.^[13-16] Taheri *et al.*^[16] assessed the oral health-related knowledge, attitudes, and practice of nursing students in Abadan, concluding that the students' moderate attitudes towards oral hygiene might be because of primary weaknesses in these individuals' training. It was thus recommended to set up training classes to promote the individuals' attitudes by experienced teachers.

After the intervention, 24 knowledge questions were answered correctly by >80% of the participants in this study. However, the three remaining questions in three subgroups (#3, #4, and #8) were answered correctly by <80% of the participants, even after intervention. These questions included the following topics: dental radiography in pregnancy, the effect of swallowing toothpaste by children on teeth, and urgent dental treatment during the third trimester. Thus, instructors might have to emphasize these topics and provide strong evidence to better improve the knowledge of the educational sessions' participants in the future.

Consistent with the study by Patil *et al.*,^[21] most of the participants in this study believed that dental treatment costs prevented pregnant women from visiting dentists during pregnancy, and over half of them reported that pregnant women did not understand the importance of oral hygiene during pregnancy. This is consistent with a study by George *et al.*,^[22] in which less than half of the women surveyed were aware of the potential adverse effects of poor oral health during pregnancy. Thus, a contributing factor to the low uptake of dental services by pregnant women is the lack of awareness among them about the importance of maternal oral health during pregnancy.^[22]

Another attitude reported by more than a third of the participants was dentists' avoidance of treating pregnant women, which must be taken into account since midwives and antenatal care providers have regular contacts with pregnant women, and their attitudes can be considered a reflection of pregnant women's true reports of dentists' avoidance. Studies have shown that dentists are sometimes reluctant to treat pregnant women for various reasons, such as the fear of harming the fetus, fear of litigation, or patient safety concerns.^[23] This reluctance can be reduced by re-training dentists.

Although it is well established that dental treatment during pregnancy is extremely safe and will not result in adverse pregnancy outcomes,^[24] a particularly worrying finding was that nearly 40% of the participants believed that dental treatment during pregnancy is not safe or did not have any idea about its safety. George *et al.*^[22] reported that nearly a third of the pregnant women avoided consulting a dentist because of safety concerns regarding dental treatments. This is a commonly cited barrier for pregnant women seeking

dental care.^[16,17] Based on this study's results, the knowledge of midwives and antenatal care providers on dental treatment safety during pregnancy should be improved by providing educational sessions and instructions.

More than 70% of participants in this study examined the oral cavity of pregnant women with oral health complaints and provided some recommendations for visiting dentists and oral hygiene during pregnancy. These findings are also consistent with a study by Malek Mohammadi *et al.*^[14] In contrast, a previous study by Mohebbi *et al.*^[15] showed that only one-third of the study participants (who were junior midwifery students) carried out oral examinations and even less provided counseling to pregnant women. However, since most midwives in Iran have not been provided with any basic knowledge or guidance on the visual inspection of the oral cavity during their training, appropriate education and training are highly required to ensure their competence in assessing pregnant women's oral health. The strong emphasis on education could be attributed to the fact that if midwives conduct visual inspections as part of the oral assessment, they should be aware of both normal and abnormal oral cavity features.

The strengths of this study include the use of a questionnaire and educational session that were based on a needs assessment of the target population and current evidence (ECC was one of the most important domains across the questionnaire and education).

Limitations of this study included the lack of a control group and the immediate post-intervention evaluation of participants' knowledge, which was inevitable due to the large sample size and difficulty accessing the target population. We suggest further research to evaluate educational programs' prolonged effect on the participants' knowledge and practice.

Conclusion

A moderate-to-high improvement in the oral health-related knowledge of midwives and antenatal care providers can be achieved through a single educational session tailored to their educational needs. Key barriers identified for pregnant women seeking dental care included high dental costs, dentists' avoidance of treating women during pregnancy, and the poor knowledge of pregnant women on the importance of oral health. The unfavorable attitudes of some participants toward the safety of dental treatments during pregnancy should also be considered seriously.

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Conflicts of interest

Nothing to declare.

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