

Effect of education based on the theory of planned behavior on adoption of oral health behaviors of pregnant women referred to health centers of Birjand in 2016

Sediqe Ebrahimipour, Hossein Ebrahimipour¹, Fateme Alibakhshian, Marzieh Mohamadzadeh²

Department of Endodontics, Faculty of Dentistry and Dental Research Center, Birjand University of Medical Sciences, Birjand, ¹Management and Social Determinant of Health Research Center, Mashhad University of Medical Sciences, Mashhad, ²Ashkhane Health Center, North Khorasan University of Medical Science, North Khorasan, Iran

Corresponding author (email: <ebrahimipourh@mums.ac.ir>)

Dr. Hossein Ebrahimipour, Management and Social Determinant of Health Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

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Abstract

Objective: Oral health of pregnant women is very important because of the adverse effects of pregnancy on the oral hard and soft tissues and vice versa. The aim of this study was to evaluate the effect of education on oral health behaviors of pregnant women based on the theory of planned behavior in Birjand. **Materials and Methods:** This quasi-experimental study was carried out among 150 pregnant women admitted to health centers, who were selected using simple sampling (75 females in each case and control group). Educational program through face-to-face training was performed in the case group, and the control group received only usual training through leaflet distribution. Data were collected using a questionnaire and analyzed by the Statistical Package for the Social Sciences version 18 software at 0.05 significance level. **Results:** The most frequent age group was 26–30 years. Before the intervention, the mean scores of knowledge, attitude, perceived behavioral control, subjective norms, behavioral intention, and performance of the intervention and control groups showed no significant difference ($P \geq 0.05$). After the intervention, the average of all scores in the intervention group showed significant increase compared to the control group ($P \leq 0.05$). **Conclusion:** Face-to-face training using the theory of planned behavior has positive impact on oral health behaviors of pregnant women. Accordingly, training sessions in order to raising awareness and positive attitude and controlling healthcare behaviors can improve oral health behaviors of pregnant women.

Key words: Education, oral health, planning theory, pregnancy, woman

INTRODUCTION

Pregnancy is a unique experience during a woman's life and is characterized by complex physiologic changes, which can adversely affect the oral health and in turn can affect pregnancy outcomes.^[1]

Increased circulating levels of estrogen and progesterone and the effects of these hormones on the gingival microvasculature, changes in dietary habits, and

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oral hygiene practices in pregnancy puts women at risk of caries and periodontal disease.^[2,3]

Vomiting, nausea or acid reflux, unpleasant feeling toward the taste of toothpaste and mouthwashes, and substantial increase in the intake of nonfermentable carbohydrates are some factors that increase the risk of caries and plaque formation during pregnancy.^[3]

Studies have shown that the transmission of cariogenic bacteria, such as *Streptococcus mutans*, from mother to the infant is increased in mothers with impaired oral hygiene and untreated dental caries. This could be one of the most important predictors for caries among toddlers.^[4,5] Oral infections, pregnancy gingivitis, periodontitis, and oral pyogenic granulomas are the consequences of poor oral hygiene during pregnancy.

On the other hand, maternal periodontal disease may increase the risk of adverse pregnancy outcomes such as pre-eclampsia, pre-term births, retarded fetal growth, and low birth weight.^[2] Evidence indicates that periodontal disease is associated with gestational diabetes mellitus (GDM) that plays a role in maternal and infant morbidity.^[6] Jacqueline *et al.* showed that oral hygiene level (OHL) were low among patients who were pregnant for the first time and that OHL was associated significantly with oral health knowledge.^[7]

Studies that have evaluated the effect of education on oral health behavior of pregnant women are few and oral health practitioners should play an important role in providing suitable methods for oral health education.

A study in Southwest Sydney showed that, despite the high prevalence of poor oral health in the area, most midwives were unaware of its possible ill-effects on maternal and child health. The findings suggest that a midwifery oral health service should be initiated and training, time constraints, and referral pathways must be addressed.^[8]

Wilson *et al.* reported that, despite having access to dental care, most pregnant women have a poor understanding of the potential oral health for both themselves and their children.^[9]

Based on mentioned points, the necessity of increasing the knowledge and practice of pregnant women in the prevention of oral diseases is deeply felt. Researches in developed countries have shown that 80% of the oral diseases are preventable via education.

Considering the importance of education in improving the health behavior of pregnant women, it is expected that healthcare workers acquired sufficient knowledge and skills in prevention of oral disease^[10] to maintain oral health of people, particularly of vulnerable groups.^[11-13] Hence, undoubtedly one of the strategies that could be used is oral health education, and its effectiveness depends on the proper use of the appropriate theory and models. The theory of planned behavior was introduced in 1885 and was developed in 1995 by Ajzen and Fishbin.^[14] This theory consists of constructions and states that the main cause of a behavior is intention. Intention is also influenced by attitudes, subjective norms, and perceived behavioral control, and the sum of the mentioned factors determines the performance. As a general rule, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behavior in question.^[14]

This theory is among the few theories that pay attention to social factors in the creation of a specific behavior. This theory can be used in the field of oral health education in pregnancy.

Considering the lack of knowledge of pregnant women regarding the importance of oral health, the aim of the present study was to assess the effect of education on the promotion of oral health in pregnant women based on the planned behavior theory among women attending maternal health centers of Birjand.

MATERIALS AND METHODS

This quasi-experimental study was carried out among 150 pregnant women who were selected using the random sampling method among women referred to the health centers of Birjand in 2016 (75 women each in the test and control group).

Informed consent was obtained from each participant. The study was approved by the Ethics Committee of Birjand University of Medical Sciences and the health centers of Birjand city in 2016. The studied samples were selected from two health centers with socioeconomic and cultural similarities. Based on the following formula:

$$n = \frac{\left(Z_{1-\alpha/2} + Z_{1-\beta} \right)^2 \left(s_{d1}^2 + s_{d2}^2 \right)}{\left(\bar{d}_1 - \bar{d}_2 \right)^2}$$

with a confidence interval of 95% and power of 80%, and based on the previous study, the number of samples was calculated to be 68 for each group.^[15] Anticipating some dropout cases, the sample size was calculated to be 75 in each group. The study was carried out in a period of 3 months. Inclusion criteria were consent of women to participate in the study, gestational age of less than 24 weeks, the ability to read and write, not affecting advanced oral disease, and not employed in professions related to dentistry. Exclusion criteria were absence from the educational program, lack of an interest to fill the questionnaire or incomplete response to the questionnaires. Data collection tools was a standard questionnaire whose validity and reliability was confirmed in a study by Ebrahimipour and Mohamadzadeh.^[15] The questionnaire included demographic data (10 questions) and questions related to knowledge (12 questions), attitude (7 questions), subjective norms (4 questions), perceived behavioral control (5 questions), intention (5 questions), and performance (7 questions). Each participant completed the questionnaires on two separate occasions (pre-intervention and 2 months after intervention) to evaluate the effectiveness of the educational interventional program. During a 2-month period, pregnant women in the case group received educational intervention sessions based on the theory of planned behavior (TPB). Educational materials included lectures, slides, posters, videos, and hands-on training of oral health with full mouth model with large tooth brush and dental floss. Training sessions were conducted by an oral and dental health staff employed in the Health Centre. The control group received only usual training through leaflet distribution. Two months after the training sessions, data were collected again. This interval time was enough to assess oral health behavior in women. Statistical package for social sciences version 18 (SPSS Inc., Chicago, IL, USA) was used to analyze the data using chi-square test, independent *t*-test, and paired *t*-test and their nonparametric equivalents at 0.05% of significance level.

RESULTS

Study results showed that both the case and control groups in terms of demographic variables (age, number of children, job, literacy level, and income) are comparable with no statistically significant differences ($P > 0.05$).

Kolmogorov–Smirnov test showed that the constructions of attitude, perceived behavioral control, and intention showed normal and the constructions of knowledge, subjective norms, and performance showed non-normal distribution. Hence, for inter and

intragroup comparative evaluation, before and after the educational intervention, the mean and standard deviation in the normal and the median and interquartile range in the non-normal constructions were used.

Intergroup comparative evaluation at baseline showed that the mean grades score of knowledge (case: 9 ± 7 , control: 9 ± 8 , $P = 0.14$), attitude (case: 22.6 ± 3.6 , control: 22.4 ± 3.2 , $P = 0.77$), subjective norms (case: 18 ± 16 , control: 16 ± 15 , $P = 0.00$), perceived behavioral control (case: 17.3 ± 2.5 , control: 17.1 ± 3 , $P = 0.6$), intention (case: 18.7 ± 2.8 , control: 18.8 ± 3 , $P = 0.71$) and performance (case: 8 ± 7 , control: 9 ± 7 , $P = 0.14$) were comparable and had no significant differences [Tables 1 and 2].

However, intergroup comparative evaluation after the educational intervention showed that the mean grade scores of knowledge (case: 10 ± 9 , control: 9 ± 8 , $P = 0.00$), attitudes (case: 26.3 ± 3.4 , control: 22.2 , $P = 0.00$), subjective norms (case: 16 ± 15 , control: 16 ± 15 , $P = 0.00$), perceived behavioral control (case: 18.5 ± 2.9 , control: 16.7 ± 2.7 , $P = 0.00$), intention (case: 21.4 ± 2.5 , control: 18.4 ± 2.8 , $P = 0.00$) and performance (case: 12 ± 10 , control: 7 ± 6 , $P = 0.00$) had a significant increase in the case group compared to the control group [Tables 1 and 2].

Data analysis using paired *t*-test and Wilcoxon test showed that after educational intervention in the case group all constructions of knowledge (before: 9 ± 7 , after: 10 ± 9 , $P = 0.00$), attitudes (before: 22.6 ± 3.6 , after: 26.3 ± 3.4 , $P = 0.00$), subjective norms (before: 16 ± 15 , after: 18 ± 16 , $P = 0.01$), perceived behavioral

Table 1: Scores of normally distributed variables before and after the intervention in pregnant women

	Mean±SD		P; Independent t-test
	Case group	Control group	
Attitude			
Before intervention	22.6±3.6	22.4±3.2	0.77
After intervention	26.3±3.4	22.2±3.1	0.00*
P value (Paired t-test)	0.00*	0.28	
Perceived behavioral control			
Before intervention	17.3±2.5	17.1±3	0.6
After intervention	18.5±2.9	16.7±2.7	0.00*
P value (Paired t-test)	0.00*	0.02*	
Intention			
Before intervention	18.7±2.8	18.8±3	0.71
After intervention	21.4±2.5	18.04±2.8	0.00*
P value (Paired t-test)	0.00*	0.00*	

*The differences were significant

control (before: 17.3 ± 2.5 , after: 18.5 ± 2.9 , $P = 0.00$), intention (before: 17.3 ± 2.5 , after: 21.4 ± 2.5 , $P = 0.00$) and performance (before: 8 ± 7 , after: 12 ± 10 , $P = 0.00$) increased significantly rather than baseline.

In control group, the constructions of knowledge (before: 9 ± 8 , after: 9 ± 8 , $P = 0.00$), subjective norms

(before: 16 ± 15 , after: 16 ± 15 , $P = 0.00$), perceived behavioral control (before: 17.1 ± 3 , after: 16.7 ± 2.7 , $P = 0.02$), intention (before: 18.8 ± 3 , after: 18.04 ± 2.8 , $P = 0.00$) and performance (before: 9 ± 7 , after: 7 ± 6 , $P = 0.00$) except for attitude (before: 22.4 ± 3.2 , after: 22.2 ± 3.1 , $P = 0.28$) showed significant increases too but the increase was less than the case group [Tables 1 and 2].

Table 2: Scores of non-normally distributed variables before and after the intervention in pregnant women

Group Variable	Case group Median and percentiles	Control group Median and percentiles	P; Mann Whitney
Knowledge			
Before intervention	9±7	9±8	0.14
After intervention	10±9	9±8	0.00*
P value (Wilcoxon)	0.00*	0.00*	
Subjective norm			
Before intervention	16±15	16±15	0.99
After intervention	18±16	16±15	0.00*
P value (Wilcoxon)	0.01*	0.00*	
Performance			
Before intervention	8±7	9±7	0.14
After intervention	12±10	7±6	0.00*
P value (Wilcoxon)	0.00*	0.00*	

*The differences were significant

Performance had the most correlation with intention ($r = 0.491$), followed by perceived behavioral control ($r = 0.363$) and subjective norms ($r = 0.314$). Intention showed the most correlation with subjective norms ($r = 0.374$) followed by perceived behavioral control ($r = 0.313$).

DISCUSSION

This study was designed based on the TPB and educational intervention was conducted according to the theory variables to promote oral health behaviors of pregnant women during a 3-month period.

Most pregnant women aged between 26 and 30 years, had college education, had experienced their first or second pregnancy, and had a low income level [Table 3]. Before the intervention, the mean grade

Table 3: Distribution of demographic variables in the case and control groups

Groups demographic characteristics	Case group		Control group		P
	NO	(%)	NO	(%)	
Age (years)					
16-20	2	(2.7)	3	(4.1)	0.29
21-25	1	(2.3)	22	(30.1)	
26-30	928	(37.3)	25	(34.2)	
31-35	23	(30.7)	15	(20.5)	
36-40	3	(4)	8	(11)	
Level of education					
Elementary school	3	(4)	6	(8)	0.34
Middle school	4	(5.3)	9	(12)	
High school	30	(40)	21	(28)	
College or University	38	(50.6)	39	(52)	
Monthly family Income					
Low (≤ 300 \$)	53	(70.7)	57	(76)	0.13
Moderate (300-600\$)	19	(25.3)	16	(21.3)	
High (>600\$)	3	(4)	2	(2.7)	
Job					
yes	19	(25.3)	11	(14.6)	0.34
No	56	(74.6)	64	(85.4)	
Number of children					
0	29	(38.7)	33	(44)	0.47
1	28	(37.3)	25	(33.3)	
2	10	(13.3)	14	(18.7)	
≥ 3	8	(10.6)	3	(4)	

There were no significant differences between the two groups in case of demographic variables

scores of demographic characteristics and all variables (knowledge, attitudes, subjective norms, perceived behavioral control, intention, and performance) between the two groups were comparable and there were no significant differences ($P > 0.05$). This confirms that the two groups were similar in terms of socioeconomic and cultural aspects.

After intervention, the mean scores of knowledge, attitude, and subjective norms increased in the case group as a significant difference was observed compared to the pre-intervention and also compared to the control group ($P < 0.05$). Our findings showed that the educational intervention based on the TPB improves all the components influencing the behaviors in pregnant women, so that enhancement of knowledge, change of attitude and perceived behavioral control, positive impact on subjective norms and behavioral intention ultimately resulted in the promotion of oral health behaviors of pregnant women. Alexandrina noted that knowledge, attitude, and perceived behavioral control with impact on behavioral intention promote oral health in first-year medical students. These findings could help both dentists and dental hygienists in oral health education to the patients and changing patients' oral hygiene habits.^[16]

The TPB is based on the concept that, the stronger the intention to perform a given behavior, the greater the likelihood that the person will perform that behavior.^[14] Similarly, the current study also showed that performance had the most correlation with intention ($r = 0.491$) and intention showed the most correlation with subjective norms ($r = 0.374$) followed by perceived behavioral control.

Ebrahimipour *et al.* showed that education of pregnant women based on TPB improved all the components influencing the oral health behaviors, except for subjective norms.^[15] Researches showed that oral health education is effective in improving the knowledge, attitude, and practice regarding oral health and in reducing the plaque and bleeding on probing of the gingival and caries.^[17,10]

Brein *et al.* used the TPB to identify predictors of oral hygiene and noted that periodontal practitioners should consider the strong associations of attitude and perceived behavioral control with brushing and interdental cleaning behaviors when designing interventional efforts to improve patient home care.^[18]

In a study by Viera *et al.*, TPB was used to assess patients' intentions and behavior to predict the

willingness to undergo prosthodontics care. They concluded that perceived behavioral control was a relevant TPB component that encompasses perception of costs, opportunity cost, perceived need, and access to dental care.^[19]

Most participants of the current study had academic education that facilitated their learning process. Hence, education based on TPB could have more positive impact on all components that lead to behavioral changes.

One of the noteworthy points in this study was improvement in the results of the control group in the second stage of completion of the questionnaire. Although comparison of the two groups after intervention showed a significant difference in the case group rather than the control group ($P < 0.05$), it seems that the leaflet distribution acted as a confounding factor and promoted oral health behaviors.

In the case group, educational intervention was done as face-to-face training sessions, whereas in the control group, information was propagated as leaflet distribution, which ultimately leads to development of all constructions except the attitude. A study by Karimi *et al.* also showed that lectures has a positive effect on the knowledge and attitude while the pamphlet does not alter the attitude.^[20] Therefore, face-to-face training along with change in the attitude further promote the health behaviors.

Education is the key element in the success of health care services, including oral health education, and the best approach is face-to-face education, which leads to learning stability and ultimately behavioral changes. Oral health education should be accessible and acceptable to the target group, and negative perceptions in the community must be modified through providing proper messages via holding educational classes in health clinics. Meanwhile, the use of training leaflet which is actually a lightweight and inexpensive media which can be used anytime and anywhere can be considered in case of impossibility to attend training sessions.

Among the study limitations were rush in carrying out the study and intervention due to pregnancy, difficulty in completing the questionnaire due to physiological conditions of women, and the use of self-report tools for data collection. It is suggested that oral hygiene instruction programs be included in the pre-pregnancy care schedule and periodic examinations be carried out to evaluate adherence and maintaining good oral hygiene among women.

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Conflicts of interest

There are no conflicts of interest.

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