

## The Effect of Educational Intervention Based on the Theory of Planned Behavior in Promotion of Oral Health Behaviors in Pregnant Women of Rafsanjan City, Kerman, Iran

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### ABSTRACT

**Introduction:** Theory of planned behavior can provide a framework for intervention to understand how to prevent health problems. The aim of this study was to determine the effect of training intervention based on the theory of planned behavior in promoting oral health behavior of pregnant women who visit health care centers of Rafsanjan.

**Methods:** In this educational intervention trial, 100 pregnant women in Rafsanjan were selected by multi-stage sampling in 2016. Initially, four centers were randomly selected, followed by two centers selected as intervention groups and two centers as control groups. Data were collected using a three-part researcher-made questionnaire, that were completed by pregnant women in two periods, ie, before and three months after the intervention. Quantitative data were presented as mean  $\pm$  SD and qualitative data as n (%). First, the homogeneity of the two groups was examined using an independent t-test and chi-square test. Data were analyzed with SPSS 18. The significance level of all tests was considered to be 0.05.

**Results:** Findings showed that there was no statistically significant difference between the demographics of the two groups ( $p > 0.05$ ). After the implementation of the program, the mean score of intervention in all constructs of the theory of planned behavior model was significant between the control and intervention groups ( $p < 0.001$ ). Following the educational program, the oral health behavior of pregnant women increased in the intervention group ( $3.72 \pm 4.22$ ) which was significantly higher than the control group ( $1.48 \pm 2.58$ ) ( $p < 0.001$ ).

**Conclusion:** The results of this study showed that educational interventions can focus on the subjective norm which had fruitful results in the field of oral health. This theory can be used as an appropriate model for oral health promotion programs.

**Keywords:** Early intervention, Educational, Oral health; Pregnant women

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## Introduction

Oral health is a necessity and part of public health in the World Health Organization. One of the programs of the World Health Organization in the field of prevention of chronic diseases and health promotion is to pay attention to oral health. Poor oral hygiene can affect the quality of life (1). Although dental caries threaten all age and sex groups of the population, this need is more important in the group of pregnant women to maintain their health and that of their fetus (2). Oral hygiene behaviors during pregnancy are important because of their consequences on maternal and child health (3). Oral diseases during pregnancy are associated with adverse outcomes, including preeclampsia, preterm delivery, low birth weight, hospitalization of the baby at the NICU, and increased hospitalization time of the infant at the NICU (4-6). Tooth decay is one of the most common infectious diseases in developing countries, and attention to this issue is one of the programs of the World Health Organization in the field of prevention of chronic diseases and health promotion (7).

Pregnant women, due to specific certain mental and physical changes during pregnancy, such as nausea and vomiting in the morning, which teeth are exposed to stomach acid. These conditions cause exposure to special risks and problems, including oral and dental problems (3). Therefore, informing pregnant women about the issues of this period and how to prevent or combat oral and dental problems is important (8, 9). Pregnant women are more at risk for caries and periodontal disease than other members of society. Gingivitis and periodontal disease are very common during pregnancy (10, 11) as a quarter of women of childbearing age have tooth decay (12).

In a study conducted in Arak for pregnant women, the average number of decayed, pulled, and filled teeth as shown with DMFT (Decay-Missing- Filling- Teeth) was  $5.4 \pm 2.83$  (2, 8) while in Ahvaz, an average DMFT in pregnant women of  $3.01 \pm 6.23$  was reported (13).

A study by Ahmadiyan et al. found that about 63% of pregnant Asian mothers in the UK

increased their sugar intake during pregnancy, and about 65% of them used toothbrushes only once a day, and about 59% of them had bleeding gums while brushing (14). According to a study by Kandari et al., 45% of women believe that dental procedures should not be performed during pregnancy (15).

These results indicate the need for planning to prevent tooth decay in all population groups, especially the vulnerable group of pregnant women (2, 16).

According to existing self-care studies, prevent tooth decay is a function of factors: knowledge, attitude, motivation, performance and skill, individual beliefs, and culture, and society (17, 18). One of the models used to predict a person's behavior is the programmed behavior model, which predicts a person's intention to perform the behavior (19) and explains on average about 40% of the relationship between intention and health behavior (20). In addition to individual factors, this model also pays attention to social factors that play a role in behavior. The programmatic behavior model was proposed in 1885 and developed in 1991 by Ajzen (21). According to this model, the intention to practice a certain behavior is guided by three factors: the person's opinion that the behavior will lead to a result and the evaluation of this result by the person (behavioral beliefs), the opinion about the normative expectations of others and the person's motivation to adapt to this. Expectations (normative beliefs), beliefs about the existence of facilitating factors or barriers to behavior, and perceived power about each of these factors (control beliefs). As a general rule, in this model, a person's positive attitude toward work, desirable subject norms, and high perceived behavioral control make a person intend to engage in a behavior (22).

Model behavior programs have been used in studies such as smoking cessation, vaccination, prevention of diseases such as AIDS, cancer, and tuberculosis, issues such as family planning, prevention of road accidents (23), predicting the behavior of brushing and flossing (24), workplace

safety (25), the use of helmets (26), adolescent physical activity (27), and behavioral prediction (28). One of the important activities to improve the health of oral health in the community is the use of appropriate and effective educational models with a focus on education and prevention. Since no study has been conducted in this regard for pregnant women in Rafsanjan, the aim of this study was to determine the effect of educational intervention based on the planned behavior model in raising awareness and behavior of oral health of pregnant women in Rafsanjan.

### Methods

This study is an educational intervention trial that was conducted on the statistical population of pregnant women in Rafsanjan (Northwest of Kerman city) in the summer of 2016. In this study, the sample size (Pokac formula) was selected based on the study of Mazloomi et al. (25), and 100 people were identified.

$$n = \frac{\left( Z_{1-\alpha} + Z_{1-\beta} \right)^2 (s_1^2 + s_2^2)}{(\mu_1 - \mu_2)^2}$$

In the following formula,  $\mu_1$  and  $\mu_2$  are the average before and after, and  $s_1$  and  $s_2$  are the standard deviations before and after.

Thus, due to the demographic distribution of Rafsanjan city, it was determined that nine urban health centers are not significantly different in terms of social and economic factors. Therefore, out of nine urban health centers, four centers (centers 1, 3, 6, and 7) were randomly selected for sampling and then again randomly, two centers as intervention groups (1 and 6) and two centers were selected as the control group (3 and 7).

The method started with the researcher introducing himself, and after stating the objectives of the project, ensuring the anonymity of the questionnaire and confidentiality of information, and conscious satisfaction, invited the pregnant women who refer to these health centers to participate and cooperate in the research. After obtaining informed consent and recording information about them, 100 pregnant women matching the criteria of being indigenous, having

minimal cycle literacy, and having conscious consent to participate in the study to enter the study, were selected through convenient sampling. Pregnant women who studied dentistry, had dentures, or advanced oral diseases were not included in the study.

A researcher-made questionnaire consisting of three parts was used in this study, the validity and reliability of which were previously confirmed in the study of Farzaneh et al. in 2016 (29). The first part was about demographic information. The second part is the 'Oral Hygiene Behavior Determination Questionnaire' that includes 7 questions with a Likert scale answer to 4 options: not at all, sometimes, once a day, and twice a day and more to study and determine the score of oral health behavior of pregnant women. For options 1 to 4, scores of 0 to 3 were given, respectively. According to this questionnaire, the lowest score of each person is 0 and the highest score is 21, and a higher score indicates more oral hygiene. The third section includes a questionnaire related to planned behavior theory structures. This tool has 5 structures. The number of questions, the score of the questions, the range of scores, the scale for answering the questions, and the internal correlation of the dimensions of the questionnaire, as well as information related to the score of oral health behavior, are given in Table 1.

In the first phase, the questionnaire was completed and collected between the two groups of intervention and distribution control, in the presence of the questioner in the form of self-report. Next, the collected information was analyzed, and based on the obtained results, the educational design (determining the content of the training, teaching methods, duration, and the number of training sessions) was prepared.

Next, an educational intervention for the two intervention groups of 25 people based on the planned programmatic behavior model consisting of 4, 60-minute training sessions were performed using the teaching method of lecturing, group discussion, pamphlet presentation, and workshop in the training hall of Health Center No. 1. At the end of the face-to-face training course, in

addition to the pamphlet and the educational booklet was also provided to them. Table 2

describes the specifications of the training programs.

**Table 1.** Specifications of the Questionnaire of Structured Behavior Theory Structures and Determining Oral Health Behavior

Tool name	Number of questions	Score	Range	Answer scale	Cronbach's alpha
Awareness	9	0-2	0-18	Likert 3 items	0.75
Attitude	8	1-5	40-80	Likert 5 items	0.82
Subject norms	7	1-5	35-70	Likert 5 items	0.92
Perceived behavioral control	8	1-5	40-80	Likert 5 items	0.70
Behavioral intent	8	1-5	40-80	Likert 5 items	0.87

In order to change the behavior of oral health and also to motivate intervention group, we sent to all members a health SMS once a week. At the next stage, three months after the end of the workshop program, the members of the intervention and control group were tested again. Additionally, after the end of the research, a training session was held for the members of the control group to observe the ethical considerations in the control group and not to deprive them of training; an educational booklet was distributed among them.

Quantitative data were presented as mean  $\pm$  SD and qualitative data as N (%). First, the

homogeneity of the two groups was examined in terms of quantitative and qualitative variables using an independent t-test and chi-square test. The normality of the data was evaluated using the non-parametric Kolmogorov-Smirnov test. To compare the mean structures of the questionnaire of Planned Behavior Theory and Oral Health Behavior of Pregnant Women, the t-test was used in two groups of intervention and control, and paired t-test was used between the two stages of pre-test and post-test. All statistical assessments were two-tailed and  $P < 0.05$  was considered significant. The data were analyzed using SPSS statistical software (version 18, Chicago, IL, USA).

**Table 2.** The Training Program for Pregnant Women in the Intervention Group Based on the Behavior Model

Number of sessions	Purpose	Training content	Training strategy	Session time
First session	Increase the awareness and attitude of pregnant women	Content on oral hygiene and adverse effects of oral problems	Learning through lectures using educational slides using group discussion methods and questions and answers	60 minutes
Second session	Increased perceived behavioral control	Content on the causes of tooth decay and oral hygiene in any situation and conduct hygienic behavior despite difficult conditions and problems during pregnancy and nutritional care	Playing the role and practical work by the learners themselves and distributing pamphlets and educational booklets among the learners	60 minutes
Third session	Improving subject norms in the oral health behavior of pregnant women	Content on the correct way to use toothbrushes and floss and diseases caused by dental problems	Practical demonstration of brushing and flossing using dental molasses and inviting family members and people around pregnant women in training sessions	60 minutes
Fourth Session	Review the contents of the previous sessions	Content on re-emphasizing the effect of controlling the perceived behavior on oral hygiene behavior	Group discussion and Q&A	60 minutes

## Result

In this study, the data of 100 pregnant women who met the conditions to be a part of the study were analyzed. The research findings showed that the mean  $\pm$  standard deviation of the intervention and control groups was  $30.78 \pm 5.67$  years and  $28.74 \pm 5.43$  years, respectively, and the observed difference was not statistically significant ( $p = 0.77$ ). Also, the mean and standard deviation of the gestational age of the intervention and control group was  $23.14 \pm 8.64$  weeks and  $21.08 \pm 6.83$  weeks ( $p = 0.189$ ). The results of the Kolmogorov-Smirnov test showed that all quantitative variables had a normal distribution ( $p > 0.05$ ).

The results of Table 3 further show that the interventions and controls were almost homogeneous in the level of education, wife's job, number of children, pregnancy rank, and family income, and there was no statistically significant difference between the two groups ( $p > 0.05$ ). Only, the frequency of job variables in the two intervention and control groups was statistically significant ( $p = 0.016$ ).

Table 4 shows the mean and standard deviation of the questionnaire structure of planned behavior theory and oral health behavior of pregnant women in two groups of case and control in two stages of pre-test and post-test. In all structures, the mean score of the intervention group was lower in the pretest stage and the difference between the mean of awareness structures ( $p = 0.014$ ), attitude ( $p = 0.027$ ) and oral hygiene behavior ( $p = 0.018$ ) was significant at the pretest stage between the intervention and control groups. In the post-test phase, the score of the intervention group in all structures and oral hygiene behavior was higher than the control group, and the mean difference of all structures in

the post-test phase between the two intervention and control groups was significant ( $p < 0.05$ ). It was not the only significant difference in oral health between the two groups ( $p = 0.659$ ).

The mean scores of all structures in the postoperative intervention group increased and the results of paired t-test showed that in all structures these differences were statistically significant ( $p < 0.001$ ). Moreover, in the control group, the mean of awareness structures ( $p < 0.001$ ), attitude ( $p = 0.026$ ), behavioral intention ( $0.017$ ), and oral hygiene behavior ( $p < 0.001$ ) were observed in the post-test. There was a noticeable increase in the significance, and the mean of other structures in the pre-and post-test phase did not have a significant difference ( $p > 0.05$ ).

Given that in all structures the mean score of the intervention group was lower in the pre-test stage and some structures revealed significant differences, it was decided to investigate the effect of educational intervention on the structures. The questionnaire of Planned Behavior Theory and Oral Health Behavior was compared in the posttest stage of the difference between post-test and pre-test scores between the two groups. The results of the independent t-test showed that the difference between post-test and pre-test scores between the two groups was significant in all structures and oral health ( $p < 0.001$ ). It should be noted that because the frequency distribution of job variables in the two groups of intervention and control was statistically significant ( $p = 0.016$ ), so the average structures in different jobs in the two groups were compared and no significant difference was observed between different occupations in the two groups ( $p < 0.05$ ).



**Table 3.** A Comparison of Demographic Characteristics of Pregnant Women in Case and Control Groups in 2016

Variables	Class	Case groups	Control groups	p
		No (%)	No (%)	
Level of Education	High school	6 (12)	4 (8)	0.766 <sup>a</sup>
	Diploma	14 (28)	11 (22)	
	Associate Degree	7 (14)	8 (16)	
	Bachelor's degree and higher	23 (46)	27 (54)	
Job	Employee	5 (10)	15 (30)	0.016 <sup>a</sup>
	housewife	36 (72)	32 (64)	
	Free	9 (18)	3 (6)	
Wife's job	Employee	13 (26)	16 (32)	0.823 <sup>b</sup>
	Free	24 (48)	21 (42)	
	manual worker	8 (16)	10 (20)	
Number of children	Others	5 (10)	3 (6)	0.960 <sup>a</sup>
	0	17 (34)	17 (34)	
	1	18 (36)	16 (32)	
	2	12 (24)	13 (26)	
Pregnancy rank	3	3 (6)	4 (8)	0.986 <sup>a</sup>
	1	14 (28)	16 (32)	
	2	17 (34)	17 (34)	
	3	11 (22)	10 (20)	
	4	6 (12)	6 (12)	
Family income	5	2 (4)	1 (2)	0.328 <sup>b</sup>
	Weak	8 (16)	6 (12)	
	medium	40 (80)	38 (76)	
	Good	2 (4)	6 (12)	

<sup>a</sup>: Chi-squared test    <sup>b</sup>: Fishers exact test significant as P < 0.05

**Table 4.** Planned Behavior Theory and Oral Health Behavior of Pregnant Women in Two Groups

Dependent variables	Groups	Pre-test mean ± Standard deviation.	Post-test mean ± Standard deviation.	P-value <sup>b</sup>	Post-test -pre-test
Awareness	control group	15.72 ± 2.59	16.92 ± 1.58	* < 0.001	1.20 ± 1.34
	Intervention group	14.18 ± 3.50	17.54 ± 1.23	* < 0.001	3.36 ± 3.56
	P-value <sup>a</sup>	* 0.014	* 0.032		* < 0.001
Attitude	control group	34.30 ± 4.82	34.94 ± 4.45	* 0.026	0.64 ± 1.17
	Intervention group	32.28 ± 4.17	37.52 ± 3.22	* < 0.001	5.24 ± 3.93
	P-value <sup>a</sup>	* 0.027	* 0.001		* < 0.001
Subject norms	control group	27.00 ± 6.74	26.60 ± 6.53	0.119	-0.40 ± 1.78
	Intervention group	26.26 ± 4.02	29.08 ± 5.72	* < 0.001	2.72 ± 4.30
	P-value <sup>a</sup>	0.564	* 0.046		* < 0.001
Perceived behavioral control	control group	28.22 ± 4.59	28.88 ± 4.38	0.226	0.66 ± 3.80
	Intervention group	27.92 ± 4.54	31.50 ± 3.80	* < 0.001	3.58 ± 4.66
	P-value <sup>a</sup>	0.744	* 0.002		* < 0.001
Behavioral intent	control group	31.70 ± 5.38	32.50 ± 4.97	* 0.017	0.80 ± 2.26
	Intervention group	30.04 ± 5.57	34.46 ± 4.03	* < 0.001	4.42 ± 5.79
	P-value <sup>a</sup>	0.133	* 0.033		* < 0.001
Oral hygiene behavior	control group	13.16 ± 3.43	14.64 ± 3.26	* < 0.001	1.48 ± 2.58
	Intervention group	11.26 ± 4.39	14.98 ± 4.34	* < 0.001	3.72 ± 4.22
	P-value <sup>a</sup>	* < 0.018	* 0.659		* < 0.001

<sup>a</sup>: Independent sample t-test

<sup>b</sup>: Paired sample t-test;

\* significant as P < 0.05

### Discussion

Since most health problems are closely related to human behavior, behavioral study models can be used to understand how to prevent oral health problems. The study findings showed that after the intervention, the average awareness score in the test group increased by about 3.36 which was consistent with the studies of Besharati et al. (30), Bahri et al. (31), Ebrahimipour et al. (11), and Jeihooni et al. (32). However, a slight change was observed in the control group which may have motivated the group to complete its questionnaire to raise awareness of oral health, and despite the lack of educational intervention during these three months, their awareness had increased slightly. Of course, as the results show, the control group from the beginning accidentally had a higher awareness than the intervention group.

The average attitude score increased after the educational intervention in the test group, which is consistent with the study of Bahri (31), and Astrom (33). However, as we knew from the beginning, the attitude of the control group was significantly higher that may be due to the sensitivity of pregnant women during this period concerning their health and especially their fetus.

Similar to Besharati et al. (30), and Hatefnia et al. (34), after the intervention, the mean score of subject norms in the test group increased significantly and was significantly higher than the control group. However, there was no significant difference in the mean score of previous subject norms and after the educational intervention in the control group, to confirm the effective role of educational intervention, especially in this area. Studies have shown that following others and accepting their beliefs, especially during pregnancy, is one of the factors influencing behavior, and naturally successful intervention on subject norms can lead to significant behavior changes.

Based on the results of the study, the mean score of behavioral intention in the experimental group after the intervention had a significant change compared to the control group. This was probably due to the design interventions based on the

structures that affect behavioral intent and is a valuable finding that could be used as a good model for designing interventions to improve health behaviors.

Finally, the results of this study showed that the behavior of the experimental group increased significantly after the intervention and reached 14.98 from 11.26. This further highlights the impact of educational intervention on the programmatic behavior model. Of course, it should be noted that in this study, the behavior of the control group also increased slightly, despite the lack of any intervention on this group. It seems that being involved in this research and completing the questionnaire provided the ground for sensitization and obtaining more information and consequently a slight behavior change.

One of the limitations of the present study was the difficulty to coordinate with pregnant women in the intervention group to attend training classes due to fatigue, overweight, boredom, and lack of serious interest, especially in the first sessions. As the training sessions progressed and the group members got to know each other, this problem became somewhat less in the next sessions. Second, the collected information was only from pregnant women who were referred to Rafsanjan urban health centers and did not include clients in private offices. Finally, due to overweight, fatigue, and boredom of women during pregnancy and their unwillingness to participate in continuing education courses, it is recommended that education be started when women visit the centers before pregnancy.

### Conclusion

The results showed that the average oral health behavior increased after the intervention. In general, the implementation of educational programs based on the theory of planned behavior had a positive and significant effect on improving oral health behavior. Therefore, it is recommended that facilities for holding training classes be held on a regular basis and at specific times during the year for pregnant women in health centers for free.

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### Conflict of interest

None declared.

### Author contribution

ZF, MR, and MA designed research; ZF, MR, and MA conducted research; ZR and ZA analyzed data; FS wrote the paper; ZF collected Data; FS had primary responsibility for final content. All authors read and approved the final manuscript.

### Ethical approval

The Ethics Committee of Rafsanjan University of Medical Sciences approved the study.

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