

# Effect of Educational Intervention on Perceived Susceptibility Self-Efficacy and DMFT of Pregnant Women

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## Abstract

**Background:** The World Health Organization identifies oral health as a necessity for public health through the entirety of life. This issue has been considerably addressed due to susceptibility to tooth decay during pregnancy and maternal and fetal health.

**Objectives:** Investigate the effect of educational intervention on perceived susceptibility, self-efficacy, and DMFT of pregnant women.

**Patients and Methods:** A quasi-experimental survey (pretest, posttest, and control group) was implemented in 88 primiparous women in the first trimester of pregnancy who attended private clinics in Delfan city, Iran. It was conducted using random sampling and then assigned to intervention and control groups. Data were collected using a questionnaire that included demographic characteristics, a DMFT checklist, and some health belief model (HBM) constructs. After collecting baseline information, an educational intervention consisting of 4 training sessions for the intervention group was scheduled. In the sessions, lecture, focus-group discussion, video, and role-playing were used as the main educational strategies. Four months after the intervention, a post-test questionnaire and DMFT checklist were conducted. Data were analyzed using SPSS (ver20) software and Chi-square, independent t-test, and repeated measure ANOVA at the significant level of  $\alpha < 0.05$ .

**Results:** According to the independent t-test, the mean score of knowledge, perceived susceptibility, self-efficacy, and DMFT was not different between the two groups before the education ( $P > 0.05$ ), during the intervention, or after intervention. Repeated measure ANOVA explained that the aforementioned score was different in the three cases (pretest, 2 months after intervention, and 4 months after intervention) after intervention ( $P < 0.05$ ). Paired t-test also showed that the DMFT mean increased 4 months after intervention in the control group ( $P < 0.001$ ). It was not, however, augmented in the intervention group ( $P = 0.92$ ).

**Conclusions:** Results showed that education on some of the HBM constructs resulted in increased knowledge of oral health, perceived susceptibility, and self-efficacy of pregnant women. It is also possible to prevent increased DMFT during pregnancy.

**Keywords:** Knowledge, Attitude, Self-Efficacy, Pregnancy, Dental Health

## 1. Background

Tooth decay is historically well established as one of the common diseases in humans that are not limited to factors such as ethnicity, age, gender, and geographic situation (1). Adult accessibility to annual oral health services was a healthy people goal in 2010 (2). Providing oral health in the promotion of public health is significantly addressed to the extent that it is regarded as one of the 11 most important goals in the twenty-first century. According to the world health organization (WHO), it is known as an essential part of public health and it is believed that poor oral health and untreated oral diseases can negatively affect quality of life (3, 4). In people of ages of 35 - 44 years, re-

duced tooth decay of 15% and gum disease of 47% are WHO aims (4, 5).

Hormonal changes and nutritional conditions make pregnant women inclined to gum disease and tooth decay. Pregnant women might also be poorly provided by health care services. In such cases, the vast majority of women, especially those who are in partial compliance with oral health before pregnancy, might suffer from severe dental pain and increasing decay during pregnancy. Pregnancy therefore requires more care; lack of attention endangers not only oral health but also other organs of the mother and fetus (6).

According to the literature, mean DMFT in pregnant

women is higher than in other. Some studies showed that the oral health status of pregnant women in Ahwaz city was moderate with a DMFT mean of  $6.23 \pm 3.01$ . Another study, from Arak city, reported that the mean of oral health behavior was lower than average (43 out of 100 points) and the mean for DMFT was also determined ( $5.4 \pm 2.83$ ) (7-9). Other surveys across the world indicated poor oral health poor conditions, showing that 58 to 65% of pregnant women were not committed to oral health care (10-13).

The most efficient way to reduce tooth decay is prevention and prevention depends on health promotion, in which public health activities play a pivotal role. It is believed that health education could decrease oral disease by 80%, with the other 20% beyond human control (7). The effectiveness of health education programs largely depends on the proper use of eligible theories and models of health education. This means that whatever the basic health needs of a community are, the better supported they are by theoretical frameworks the more effective the educational programs will be (14). One of the most effective models in education and health promotion is the health belief model (HBM), which is used in the field of preventive behaviors (15).

According to this model, when individuals adopt preventive health behaviors, they believe that they are at risk for the disease (perceived susceptibility) and that disease may lead to serious consequences (perceived severity). In addition, there are behaviors that prevent or reduce the severity of disease and its side effects (perceived benefits). There are some inhibiting factors, however, that include physical, mental, or financial barriers to this behavior (perceived barriers). To behave in a certain way, individuals must perceive themselves as capable of the behaviors (self-efficacy). The effects of some of HBM constructs on oral health behavior have been proven scientifically; these include perceived susceptibility and self-efficacy (1, 8, 16). According to the significant effect of self-efficacy, people are motivated to perform healthy behaviors and do them even in the face of challenges when they believe their manner is under control. For instance, factors affecting the appropriate use of toothbrush and floss include the capability to overcome sleepiness and boredom and the ability to start a diet with less sugar and fewer sweets (8).

Given the vulnerability of pregnant women and the impact of oral health on pregnancy and its outcomes (birth weight, preeclampsia, and preterm delivery) and an increase in mean DMFT results by delivery, the long-term effects of oral health during pregnancy include primary prevention of dental caries in children and a reduction of dental caries in adolescence. The current study aimed to explain the effect of education on perceived susceptibility,

perceived self-efficacy, and dental caries among pregnant women in Delfan city, Lorestan province, Iran (17, 18).

## 2. Objectives

Our concerns were the vulnerability of pregnant women, the impact of oral health on pregnancy and its outcomes (birth weight, preeclampsia, and preterm delivery), increased mean DMFT at delivery, and the long-term effects of oral health during pregnancy on prevention of dental caries in children and adolescents. We therefore designed the current study to explain the effect of education on perceived susceptibility, perceived self-efficacy, and dental caries among pregnant women in Delfan city of Lorestan province (14-17, 19).

## 3. Patients and Methods

A quasi-experimental survey (pretest, posttest, and control group) was conducted. The study population was 88 primiparous women in the first trimester of pregnancy, who attended private clinics in Delfan city between June and October, 2012. They were selected based on simple random sampling. Two clinics selected a control group and two clinics selected the intervention group. Participants were randomly selected from these 4 clinics of gynecology and obstetrics in the city. The sample frame was the list of pregnant women in Delfan city. To access this frame, we referred to gynecology clinics and gathered needed information.

For calculating sample size, the following (Equation 1) was used.

Comparing the mean of 2 groups:

$$n = 2 \times \left[ \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}) \times \sigma}{\Delta} \right]^2 \quad (1)$$

n = sample size;  $\alpha$  = type I error, usually 0.05 - 1.96;  $\beta$  = type II error, usually 0.20 - 0.841;  $\sigma$  = standard deviation pool;  $\Delta$  = the smallest difference of interest between the two groups.

Primiparous women in the first trimester of pregnancy with lack of oral health and progressive gum disease were included. Pregnant women were informed of the aim of the study and assured that all information would remain confidential. A written consent form was given to participants. Exclusion criteria were incomplete questionnaires, lack of interest in participation, multiparous women, and women in the second or third trimester of pregnancy. After applying the exclusion criteria, 88 women remained in the study. Data were collected using a three-part questionnaire. Part 1 included demographic characteristics, part 2

consisted of a DMFT checklist, and part 3 covered questions of HBM constructs. In part 3, there were 15 questions about knowledge, 8 questions about perceived susceptibility, and 9 questions regarding perceived self-efficacy. Knowledge questions were scored 0 to 1 (1 = correct and 0 = incorrect, scores ranged 0 - 15). Perceived susceptibility and self-efficacy were scored 0 to 4 (0 = completely disagree, 1 = disagree, 2 = I don't know, 3 = agree, and 4 = completely agree) Scores ranged 0 - 32 and 0 - 36 for perceived susceptibility and self-efficacy, respectively.

The questionnaire was used in the Shamsi et al. (8) (2012) study and its content validity was approved as 0.79. The questionnaire's Cronbach-alphas were 0.73 and 0.76 for perceived susceptibility and self-efficacy, respectively. In the Shamsi investigation, the Cronbach-alpha was more than 0.7, which indicated acceptable internal consistency (8). The questionnaire was completed by both groups before the educational sessions. The intervention group trained in four sessions of 90 minutes each. Training sessions were held in groups of 22 individuals and consisted of lecture, question and answer, group discussion, role-playing, and an educational video. To ensure educational continuity, participants were provided with pamphlets. The control group, however, received only common education at the health centers. Questionnaires were completed by control and intervention groups at 2 and 4 months after intervention. A DMFT checklist was completed by a dentist before the intervention and at 4 months after intervention in both groups. In our survey, the posttest showed adequate implementation of tooth brushing and flossing behaviors (8, 20). Data were analyzed using SPSS version 20 and included the following statistical tests: Mann-Whitney, independent t-test, and repeated measure ANOVA at  $\alpha < 0.05$  significance level. The Mann-Whitney test was used to compare educational and economy levels between the two groups. The independent t-test was used to compare mean scores for the knowledge, perceived susceptibility, and perceived self-efficacy variables between the intervention and control groups before intervention and at 2 and 4 months after intervention. The repeated measures ANOVA test was used to compare change trends from baseline to post intervention and at a 4 months follow-up.

#### 4. Results

The mean age of pregnant mother was  $23.9 \pm 4.1$  years and the mean of pregnancy duration was  $8.3 \pm 2.6$  weeks. An independent t-test indicated that the mean age of mother ( $P = 0.718$ ) and duration of pregnancy ( $P = 0.902$ ) was not different between the two groups. Concerning education, maximum and minimum attainment referred to

high school and primary education, respectively. Moderate and excellent economy had higher and lower frequencies (Table 1). An independent t-test also showed that before intervention there was not a significant correlation between the two groups regarding knowledge of oral health ( $P = 0.111$ ). Two ( $P = 0.001$ ) and four ( $P = 0.001$ ) months after the intervention, the mean score of knowledge in the intervention group was significantly higher than in the control group. Repeated measure ANOVA indicated that the control group showed no significant difference in mean score of knowledge throughout the study (tested before intervention and at 2 and 4 months after intervention) ( $P = 0.236$ ). The mean score of knowledge throughout the study was statistically different, however, in intervention group ( $P = 0.001$ ). Table 2 shows that in the intervention group, the mean of knowledge had meaningfully increased at 2 and 4 months after intervention. It also shows that the score partially decreased at 4 month after intervention from its value at 2 months (Table 2). An independent t-test indicated that the mean score of perceived susceptibility regarding oral health was not different before intervention in both groups ( $P = 0.001$ ). This score was considerably increased at 2 months ( $P = 0.001$ ) and 4 months ( $P = 0.001$ ) after intervention in the intervention group. According to the repeated measure ANOVA, the mean score of perceived susceptibility was similar in all three tests ( $P = 0.478$ ), but it was statistically different in the three tests ( $P = 0.001$ ) (Table 2).

The mean score for self-efficacy before intervention was not different between the groups, according to the independent t-test ( $P = 0.201$ ). In the intervention group, the mean score of self-efficacy was significantly higher than control at 2 months ( $P = 0.001$ ) and 4 months ( $P = 0.001$ ) after intervention. Repeated measure ANOVA also indicated that the aforementioned score was not statistically significant in the control group for the three tests ( $P = 0.140$ ). Differences at the three tests, however, were observed in the intervention group ( $P = 0.001$ ) (Table 2).

Analysis of the independent t-test indicated that the mean for DMFT was not different between the two groups before intervention ( $P = 0.606$ ). A paired t-test indicated that mean DMFT scores had increased in the control group at 4 months after intervention ( $P = 0.001$ ) compared to the intervention group (Table 3).

#### 5. Discussion

People's behavior must be directed to recognize and practice a healthy lifestyle to maintain good health and avoid illness. Failure to comply with good-health behaviors can be seen in all societies illiterate or literate, rich or

**Table 1.** Demographic Characteristics of Control and Intervention Groups

Group	Intervention Group, No. (%)	Control Group, No. (%)	P Value <sup>a</sup>
<b>Education</b>			0.645
Primary school	4 (9.1)	5 (11.4)	
Middle school	10 (22.7)	9 (20.5)	
High school	18 (40.9)	21 (47.7)	
College	12 (27.3)	9 (20.5)	
Total	44 (100)	44 (100)	
<b>Economy status</b>			0.716
Poor	7 (15.9)	9 (20.5)	
Moderate	25 (56.8)	19 (43.2)	
Good	11 (25)	15 (34.1)	
Excellent	1 (2.3)	1 (2.3)	
Total	44 (100)	44 (100)	

<sup>a</sup>Mann-Whitney test.**Table 2.** Mean Score of Knowledge, Perceived Susceptibility, and Self-Efficacy Regarding Oral Health in Control and Intervention Groups at Different Times

Variable	Group		P Value of Independent T-Test
	Intervention	Control	
<b>Knowledge</b>			
Before intervention	6.7 ± 1.5	6.3 ± 1.4	0.111
2 months after	11.2 ± 1.9	6.6 ± 1.3	0.001
4 months after	10.4 ± 1.8	6.5 ± 1.3	0.001
P value of repeated measure ANOVA	0.001	0.236	
<b>Perceived Susceptibility</b>			
Before intervention	23.7 ± 4.4	22.7 ± 8.3	0.27
2 months after	27.5 ± 2.9	22.4 ± 3.5	0.001
4 months after	27.1 ± 2.9	23.1 ± 3.6	0.001
P value of repeated measure ANOVA	0.001	0.478	
<b>Perceived Self-Efficacy</b>			
Before intervention	26.9 ± 3.5	27.9 ± 3.9	0.201
2 months after	30.4 ± 3.7	26.9 ± 3.6	0.001
4 months after	30.4 ± 3.7	26.8 ± 3.6	0.001
P value of repeated measure ANOVA	0.001	0.14	

**Table 3.** Mean for DMFT in Both Groups at the Three Tests

Variable	Intervention Group, Mean ± SD	Control Group, Mean ± SD	P Value of Independent T-Test
Before intervention	6.9 ± 4.6	6.4 ± 4.8	0.606
After intervention	6.6 ± 4.6	7.7 ± 4.9	0.292
P value of paired t-test	0.92	0.001	

poor. Healthy and unhealthy behaviors are part of all cultures. Pregnant women require attention for the health of both mother and fetus (21). Despite this importance, research indicates that pregnant women do not adequately practice oral hygiene, and are only poorly aware of the connection between oral hygiene in pregnancy and pregnancy outcomes (10, 22, 23). Dental practices considered harmful by pregnant women to themselves and their fetuses. A survey by Kandari showed that 45% of women believed that dental hygiene should not be practiced during pregnancy (24). In Habashneh's study (25), 60% of pregnant women did not realize that they should visit the dentist during pregnancy, and 68% preferred to postpone dental care until after pregnancy. Scholars found that oral health education for pregnant women and health personnel (physicians, dentists, and midwives) before and during pregnancy was necessary because of poor knowledge by mothers of oral health and its problems during pregnancy. Thus, promoting awareness of dental health by pregnant women, especially of poor socioeconomic status, is necessary (25-28). This study used HBM model constructs as a framework to promote the dental health of pregnant women. The result of our survey showed that knowledge of oral health by pregnant women before the intervention was not different. Knowledge of pregnant women in the intervention group at 2 and 4 months after intervention showed significant increases compared to the control group. This change indicates an intervention effect on the knowledge of pregnant women that is in accordance with results of Bahri et al. (29), Shamsi et al. (8), and Lina (30).

The mean score for perceived susceptibility and self-efficacy of oral health was not different between the two groups before intervention. The aforementioned scores, however, were considerably higher in the intervention group than the control at 2 and 4 months after intervention. According to a repeated measure ANOVA, in contrast the intervention group, the mean score of the experimental group perceived susceptibility and self-efficacy in the control group was not different in three times that is in relevance with Shamsi study. In other studies, the positive impact of oral health behaviors and self-efficacy has been confirmed (1, 8, 16). The results of our study showed that mean of DMFT before the intervention was not significantly different between the two groups. A paired t-test showed that mean DMFT had increased in the control group 4 month after intervention in contrast to the intervention group, indicating the health education effect of HBM constructs on lack of increased DMFT during pregnancy.

The mean DMFT in the study of Delfan city was  $6.65 \pm 4.7$ , which is more than the reported mean of pregnant women in the Ahhvaz city survey ( $6.23 \pm 3.01$ ), Arak investigation ( $5.4 \pm 2.83$ ), and in women age 30 years and over in

the Finland (23). Differences in the mean DMFT in pregnant women may be due to the influence of their culture, habits, and economic status. Oral health education must be considered as a part of the care provided to pregnant women by doctors and midwives in private clinics and health centers (7, 8, 31).

### 5.1. Conclusion

The findings of our survey showed that a health education program based on HBM constructs promoted knowledge, perceived susceptibility, and self-efficacy of oral health performance in pregnant women. In addition, considering the special condition of pregnancy, the increased DMFT associated with it, and effects of oral health on pregnancy outcomes such as fetus weight, preterm delivery, and preeclampsia, it seems beneficial to implement health education based on HBM constructs to prevent increased DMFT and tooth decay in pregnancy.

The calculation DMFT in pregnant women and the benefits of HBM variables can be considered strong points of this study.

### 5.2. Limitations

Limitations of this study included lack of cooperation by gynecologists, obstetricians, and midwives who worked in private clinics with the researchers; poor physical condition of the subjects (for example, being at risk of abortion, having nausea, and having obstetric complications that forced in-home bed rest); a time-consuming questionnaire that pregnant women with low literacy were required to complete; and lack of cooperation by pregnant women in the follow-up posttest questionnaire.

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### Footnotes

**Authors' Contribution:** Study concept and design: Hossein Shahnazi and Mehri Hosseintalaei; data acquisition: Yahya Yahyavi; data analysis and interpretation: Fatemeh Esteki Ghashghaei; drafting of the manuscript: Hossein Shahnazi; critical revision of the manuscript for important intellectual content: Abdurrahman Charkazi; statistical analysis: Mehri Hossein Talaei; administrative, technical, and material support: Hossein Shahnazi; study supervision: Gholamreza Sharifirad.

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