



Predicting Dental Caries Preventive Behaviors Among Pregnant Women Based on Self-Efficacy and the Theory of Planned Behavior

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Abstract

Background and Objectives: Pregnant women's oral and dental hygiene is of great importance to maternal and neonatal health. This study aimed to predict dental caries preventive behaviors among pregnant women based on self-efficacy and the theory of planned behavior.

Methods: This cross-sectional descriptive-analytical study was conducted in 2016 on 258 pregnant women recruited from comprehensive healthcare centers in Birjand, Iran. Sampling was done via multistage random sampling. Data collection instrument was a researcher-made questionnaire developed based on self-efficacy and the theory of planned behavior. The content validity of the instrument was approved by 10 faculty members and its reliability was approved with a Cronbach's alpha of 0.77. Pearson correlation analysis and multiple linear regression analysis were conducted via the SPSS software (v. 19.0) to analyze the data at a significance level of less than 0.05.

Results: The mean of participants' age was 27.6 ± 5.1 and the mean of the decayed, missing, and filled teeth index was 5.4 ± 3.5 . Regression analysis showed that self-efficacy and the constructs of the theory of planned behavior explained 47% of the total variance of the intention to show dental caries preventive behaviors. The strongest predictors of behavioral intention were self-efficacy ($R^2 = 0.34$) and the subjective norm construct of the theory ($R^2 = 0.313$).

Conclusions: Self-efficacy and subjective norm are the strongest predictors of dental caries preventive behaviors among pregnant women. The combination of self-efficacy and the theory of planned behavior can provide a useful framework for developing and implementing educational interventions for the prevention of dental caries among pregnant women and the promotion of maternal and neonatal health.

Keywords: Theory of Planned Behavior, Self-Efficacy, Pregnant Women, Oral and Dental Care

1. Background

Healthy mouth and teeth are among the factors behind humans' general health, thus, some people consider the mouth as the full-length mirror of the body. Therefore, oral hygiene is one of the main components of general health, the consideration of which can prevent many diseases (1). The world health organization considers oral hygiene as a lifelong necessity and notes that poor oral hygiene and subsequent oral and dental problems considerably affect quality of life. Besides, oral and dental hygiene is related to some chronic conditions (such as diabetes mellitus and cardiovascular disease) and some indicators of psychological and mental health (such as body image) (2).

Despite the importance of oral and dental hygiene, oral and dental disorders are very common. For instance, dental caries is the most common infectious dis-

ease in developing countries such as Iran. Therefore, dental caries prevention is among the global health programs for chronic illness prevention and health promotion (1).

Although oral and dental disorders can threaten all people, some are more vulnerable to them due to their physiological conditions (3). For instance, pregnancy-induced physiological changes such as increased mouth acidity, morning sickness, and gingivitis can put pregnant women at risk for dental disorders (1). The prevalence rates of periodontal disease and oral pyogenic granuloma in pregnancy are 35% - 100% and 0% - 9.6%, respectively. Moreover, during the pregnancy, the risks of having loose teeth as well as gingival crevicular fluid increase (4). Accordingly, dental hygiene is of great importance to pregnant women and their infants' health due to the fact that dental bacteria caries can be transmitted from mothers to their infants

(5). Moreover, periodontal disease in pregnancy can be directly associated with preterm delivery, low birth weight (6), preeclampsia, and neonatal hospitalization in intensive care units. Therefore, oral and dental health in pregnancy has been turned into one of the most important aspects of prenatal care (3). Through good oral and dental hygiene, pregnant women can effectively prevent periodontal disease (2). Yet, a study in Australia showed that more than 52% of pregnant women had not had a dental visit in their last pregnancy (7).

Studies show that the most effective educational interventions are those that are based on behavior modification theories such as the theory of planned behavior (TPB). TPB has been used more than other theories for healthy behavior promotion. This theory holds that the most important factor behind behavior is intention, which is in turn determined by 3 other TPB constructs, namely attitude, subjective norm, and perceived behavioral control (8). Another important requirement for behavioral modification is self-efficacy (9). Self-efficacy is defined as one's belief in his/her ability to succeed in a behavior. It can improve competence in doing behaviors and prepare people for action (10-12).

An earlier study showed the effectiveness of TPB in predicting engagement in oral and dental health behaviors among pregnant women (1). However, to the best of our knowledge, none of the previous studies assessed the combined effects of TPB and self-efficacy on dental caries and gingivitis among Iranian pregnant women. This study was done to narrow this gap. The aim of the study was to predict dental caries preventive behaviors among pregnant women based on self-efficacy and TPB.

2. Methods

This cross-sectional descriptive-analytical study was conducted in 2016 on 258 pregnant women recruited from comprehensive healthcare centers in Birjand, Iran. The formula to determine sample size for estimating the mean was used for sample size calculation. Therefore, based on the results of an earlier study for the mean score of knowledge (1) and with a type I error of 0.05, a standard deviation of 2.05, and a d of 0.25, sample size was estimated to be 258. Sampling was done via multistage random sampling. Initially, Birjand city was divided into 4 hypothetical geographical areas, namely north, east, west, and south. Then, one healthcare center was randomly selected from each area and a random sample of women was recruited from each selected healthcare center through systematic random sampling and using available lists of pregnant women in that centers. The number of women selected from each center was proportionate to the total number of women who referred to that center. Eligibility criteria were

Iranian nationality, no employment in healthcare fields, no high-risk pregnancy (i.e. no affliction by preeclampsia and gestational diabetes mellitus), basic literacy skills, and agreement for participation in the study. Selected women were informed about the study aim and were asked to provide written informed consent.

Data collection instrument was a researcher-made questionnaire developed based on self-efficacy and TPB. The questionnaire included 6 dimensions, namely attitude (16 items), subjective norm (11 items), perceived behavioral control (12 items), self-efficacy (9 items), intention (9 items), and behavior (12 items). The items of the first 4 dimensions were answered on a Likert-type scale from "Completely agree" (scored 5) to "Completely disagree" (scored 1). Negatively-worded items were scored reversely. Correct and wrong behaviors in the behavior dimension were also scored 1 and 0, respectively. The content validity of the questionnaire was approved by 10 faculty members who hold doctoral degrees in health education, epidemiology, and dentistry. Reliability assessment was also done via the internal consistency method, in which 20 women completed the questionnaire. The Cronbach's alpha values of the questionnaire dimensions were as follows: attitude: 0.7, subjective norm: 0.77, perceived behavioral control: 0.73, intention: 0.86, and self-efficacy: 0.75. Moreover, the decayed, missing, and filled teeth (DMFT) index was used to determine the number of each woman's decayed, missing, and filled teeth. The index was filled for participants by 2 midwives who had already received 1-week of DMFT assessment training from a dentist. They assessed DMFT using disposable mirror and sickle dental scaler in natural light.

Collected data were entered into the SPSS software (v. 19.) and described using the measures of descriptive statistics. The Kolmogorov-Smirnov test revealed the normality of all study variables. Therefore, Pearson correlation analysis and multiple linear regression analysis were used to analyze the data at a significance level of less than 0.05.

3. Results

In total, 258 pregnant women were studied. The mean of participants' age was 27.6 ± 5.1 and the mean of DMFT index was 5.4 ± 3.5 . Table 1 shows participants' demographic characteristics.

Correlation analyses showed that behavioral intention was significantly and directly correlated with attitude, subjective norm, perceived behavioral control, and self-efficacy ($P < 0.01$; Table 2). Moreover, the results of regression analysis illustrated that subjective norm, perceived behavioral control, and self-efficacy explained 47% of the total variance of behavioral intention. The strongest predictor of behavioral intention was self-efficacy ($R^2 = 0.34$)

Table 1. Participants' Demographic Characteristics

Characteristics	Frequency	Percent
Age, years		
Less than 24	78	30.2
25 - 34	148	57.3
35 and more	32	12.5
Educational status		
Primary	18	7
Guidance school	57	22.1
Diploma	104	40.3
University	79	30.6
Income		
Low	37	14.3
Moderate	131	50.8
High	90	34.9
Rank of pregnancy		
First	94	36.43
Second	88	34.1
Third and more	76	29.46

followed by subjective norm ($R^2 = 0.313$) and perceived behavioral control ($R^2 = 0.271$) (Table 3).

4. Discussion

The aim of this study was to predict dental caries preventive behaviors among pregnant women based on self-efficacy and TPB. The constructs of TPB and self-efficacy explained 47% of the total variance of the intention to show dental caries preventive behaviors. This finding denotes that the combination of TPB and self-efficacy can be an appropriate model for the prediction of behavioral intention among pregnant women. In line with our finding, previous studies also showed that TPB significantly predicted behavioral intention by 61% (13), 61% (13), and 36% (14).

Study findings revealed self-efficacy as the strongest predictor of behavioral intention. By definition, self-efficacy is one's belief in his/her ability to succeed in a behavior. It is a key requirement for behavioral modification (15, 16). Belief in one's own ability to show a behavior improves competence in showing that behavior and prepares the individual for it (10, 17). An important method for promoting self-efficacy in dental caries preventive behaviors is to achieve mastery over showing the behaviors through repeated exercise. Self-efficacy is a significant factor behind behavioral modification due to the fact that individuals

with the highest level of behavioral modification have high levels of self-efficacy (18).

Findings also indicated that self-efficacy explained 34% of the total variance of the intention to show dental caries preventive behaviors. Therefore, combining self-efficacy with TPB is necessary to improve the outcomes of TPB-based interventions because self-efficacy can link knowledge, behavior, and the belief in having the ability to show a behavior. The results of an earlier study also indicated that the constructs of TPB and self-efficacy explained respectively 35.6% and 23.4% of the total variance of behavioral intention (18). Contrarily, another study reported that self-efficacy was not a significant predictor of tooth-brushing behavior among students (19).

Beside self-efficacy, the 2 other strong predictors of behavioral intention were subjective norm and perceived behavioral control. These 2 factors respectively explained 0.313 and 0.271 of the total variance of behavioral intention. Subjective norm is affected by different factors such as parents, spouse, friends, midwives, physicians, and dentists. The most important sources of subjective norm reported by our participants were healthcare providers (36%), close friends (28%), spouse (20%), and dentist (16%). Previous studies reported subjective norm as the strongest predictor of cigarette smoking (20-22). Another study also showed that attitude and subjective norm were strong predictors of fast food consumption by female adolescent students (13, 22).

In the present study, the predictive power of subjective norm was greater than perceived behavioral control and attitude. Similarly, 2 earlier studies showed that the effects of subjective norm on tooth-brushing and flossing behaviors were greater than other factors (12, 20). However, other studies reported that subjective norm was not a significant predictor of behavior (14, 23). This contradiction can be attributed to the differences in the populations and the subject matters of the studies.

Our findings regarding perceived behavioral control were in line with the findings of previous studies (23, 24). Perceived behavioral control is one's perception about his/her control over showing or not showing a given behavior. Study findings also showed that behavioral intention was significantly correlated with self-efficacy and all TPB constructs, namely attitude, subjective norm, and perceived behavioral control. The strongest correlations were related to self-efficacy and subjective norm. Previous studies also reported the same findings (13, 25).

4.1. Conclusion

This study indicated that the combined model of self-efficacy and TPB can significantly predict the intention of showing dental caries preventive behaviors. Therefore,

Table 2. Correlations Among Self-Efficacy and TPB Constructs

Variables	Attitude	Subjective Norm	Perceived Behavioral Control	Self-Efficacy	Intention	Behavior
Attitude						
Subjective norm	$r = 0.325^a$					
Perceived behavioral control	$r = 0.356^a$	$r = 0.473^a$				
Self-efficacy	$r = 0.325^a$	$r = 0.506^a$	$r = 0.478^a$			
Intention	$r = 0.316^a$	$r = 0.560^a$	$r = 0.521^a$	$r = 0.583^a$		
Behavior	$r = 0.203^b$	$r = 0.37^a$	$r = 0.361^a$	$r = 0.302^a$	$r = 0.272^b$	

^a $P < 0.001$.^b $P < 0.05$.**Table 3.** The Results of Multiple Linear Regressions for Predicting Behavioral Intention Based on Self-Efficacy and TPB Constructs

Model	Beta	R ²	F	P Value
1- Attitude	0.316	0.1	28.4	≤ 0.001
2- Subjective norm	0.56	0.313	116.85	≤ 0.001
3- Perceived behavioral control	0.521	0.271	95.2	≤ 0.001
4- Self-efficacy	0.583	0.340	132.08	≤ 0.001
5- Subjective norm and self-efficacy	0.759	0.434	97.92	≤ 0.001
6- Subjective norm, self-efficacy, and perceived behavioral control	0.843	0.471	75.3	≤ 0.001

this model can be used to promote oral and dental health among pregnant women and thereby, to improve maternal and neonatal health. A limitation of this study was the large number of the questionnaire items. Future studies are recommended to use more limited number of items for the assessment of self-efficacy and TPB constructs.

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