

An Investigation into the Predictors of Behavior Promoting Oral and Dental Health in Pregnant Women Based on the Health Belief Model (HBM)

Original Article

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Abstract

Introduction:

Oral and dental health is viewed as one of the most important domains of public health, which is of over riding importance among mothers who, with regard to their role in maintaining their health and their children's health, are considered one of the vulnerable groups.

Materials and Methods:

This is a cross-sectional study in which 110 pregnant mothers referring to 15 Health Treatment Centers of Rasht (totally 33 centers) were randomly selected. The data were collected by distributing a questionnaire with items on awareness, different dimensions of the Health Belief Model (HBM), and practices in relation to oral and dental health care. The data were then analyzed.

Results:

Findings showed that the mean practice score of mothers on "the practice of oral and dental health care by pregnant women" was 37.5 ± 15.9 in relation to oral and dental health care for pregnant women. Awareness ($\beta = 0.382$) and among the structures of the Health Belief Model, perceived sensitivity ($\beta = -0.263$) and perceived obstacles ($\beta = -0.367$) were the most significant predicting factors of behavior of oral and dental health in pregnant women. These variables indicated 20% variance for oral and dental health care behavior.

Conclusion:

This study indicated the efficiency of the health belief model (HBM) in predicting behavior promoting oral and dental health among pregnant mothers.

Key words:

•Health Behavior •Oral Health •Pregnant Women.

Introduction

Tooth decay is one of the most epidemic diseases of humans. Although it threatens all age and gender groups, some groups in the society are more vulnerable to tooth decay than other people due to their special physiological conditions.^(1,2)

One of the vulnerable groups to tooth decay is pregnant women. Hormonal changes during pregnancy expose them to oral–dental problems such as gingivitis. The gingiva becomes inflamed, swollen, and sensitive because of an increase in estrogen levels and easily bleeds. Advanced periodontal infections during pregnancy period cause some problems for placenta and uterus, and, as a result, the probability of premature delivery increases and the bacteria causing dental decay are transferred from the mother or the babysitter to the baby.⁽³⁾ Mothers' periodontal diseases through the transfer of bacterial products such as endotoxins and the functional inflammatory mediators produced by mothers are indirect risk factors for premature delivery and neonates' underweight at birth time.^(4,5) Exposing the embryo to oral pathogenic bacteria increases the probability of newborn hospitalization in the ICU ward.⁽⁴⁾ However, in spite of the significance of this issue, results of different studies have indicated that women do not pay sufficient attention to their oral and dental health during the pregnancy period.

Shamsi et al. reported that a majority of mothers do not have adequate information about the significance of observance of oral and dental health care during the pregnancy period, which can be due to not providing accurate information to mothers during their pregnancy period by caretakers such as the midwives of Health Centers as the first carers of mothers during pregnancy or even before this time.⁽²⁾ In a study conducted by Thomas et al., more than 50% of pregnant women were not visited by dentists during their recent pregnancy.⁽⁶⁾ Several pregnant mothers believe that dentistry procedures are harmful for themselves or their embryo. Candan et al. indicated that 45% of women believe that dentistry procedures must not be performed during pregnancy.⁽⁷⁾

As promoting oral and dental health appears necessary, the most important principle in this regard and at the top of all procedures is health

education. Today, health carers' approaches to health education have changed and traditional educational interventions have been replaced by template-oriented training interventions. One of the most effective training models for promoting health is the Health Belief Model (HBM). This template, which was designed in the late 1950s and has been developing gradually, is used for prevention of diseases.⁽⁸⁾

This model predicts behavior on the basis of the structures of perceived sensitiveness, perceived intensity, understood benefits and understood obstacles, and guidance for function and self-efficacy.⁽⁹⁾

As having access to health care during pregnancy results in promotion of the health of mothers and their fetuses, the society-oriented health nurses help in the promotion of health of mothers and children. In this regard, one of the most important duties of nurses is to investigate the availability of such services for pregnant women. Studies have shown that nurses may have an important part in increasing women's information about oral and dental health behavior and can also train other health carers in this domain.⁽¹⁰⁾ Therefore, in the present study, we tried to promote the oral and dental health of mothers by designing and implementing a training intervention based on HBM.

Materials and Methods

In this cross-sectional study, 110 samples were randomly selected from the pregnant women referring to 15 health treatment centers of Rasht city (totally 33 centers).

According to the study of Shamsi et al.⁽¹⁾, 110 samples were required, and with regard to the population under investigation, a specific number out of the samples in each center was selected. The criteria for including the mothers into our study were pregnant mothers at their first delivery; lack of gingival, oral, or dental advanced diseases; having least reading and writing ability; lack of occupation of some professions pertinent to dentistry; and providing informed consent for participation in the study. The required data were collected by a questionnaire developed in Iran by Shamsi et al.⁽¹¹⁾, which consists of items on awareness, dimensions of HBM, and performance check list. Questions of the dimensions of HBM consist of

perceived sensitivity (8 questions such as How much do mothers feel themselves suffering from tooth decay?), questions of perceived intensity (7 questions such as the questions about side effects occurring in the mother or embryo due to tooth decay, and so on), questions of the perceived benefits (10 questions such as questions about the advantages raised from fulfillment of oral and dental health care behavior and some benefits, including prevention from tooth decay, and so on), perceived obstacles (14 questions on some items such as expenses, load of work, and lack of awareness about accurate techniques of tooth brushing or using dental floss), self-effectiveness (8 questions such as the ability to use toothbrush, dental floss, and other health-related tools correctly), and cue to action (8 questions such as forces pushing mothers toward feeling of necessity to follow health care such as dentist, midwife, and husband). All questions of the attitude sections were designed on the basis of a 5-item Likert Scale, and the questions of guide to operation were calculated as cumulative frequency. Cronbach's alpha was calculated for diverse sections of the questionnaire, and the values more than 0.7 were considered acceptable. The calculated Cronbach's alpha values were as follows: perceived sensitivity 0.72, perceived intensity 0.7, perceived benefits 0.74, perceived obstacles 0.71, self-effectiveness 0.79, and guide to action 0.73. Therefore, the instrument's reliability was evaluated at a good level and was confirmed.

Meanwhile, 14 questions in various domains were compiled in relation to performance, for example, methods of tooth brushing and tooth flossing, regular dentist visiting, and applying fluoride mouthwash after nausea or vomiting. The first two items were evaluated by direct observation of mothers' performance on oral and dental replica (observing some items such as correct movement angle of toothbrush on different parts of the tooth, vibration moves in gingival sulcus, horizontal moves in chewing level, vertical moves of toothbrush in frontal and internal levels, manner of movement between teeth, correct turning of tooth-floss around the finger, and others). Other functions of the mothers were registered as self-reporting. The rating of the questionnaire is as follows: In the part of perceived sensitivity, intensity, benefits and obstacles, and

self-effectiveness, the rating of each question is based on variables ranging from 1 to 5, in such a way that 1 is for the answer of "I completely disagree, 2 is for "I disagree," 3 is for "I do not have any idea," 4 is for "I agree," and 5 is for "I completely agree." The total rating of each of these parts (perceived sensitivity, intensity, benefits, obstacles, and self-effectiveness) was calculated on the basis of 100 scores of the performance check list; rating 1 belonged to correct behavior and rating 0 was for incorrect behavior. The scoring of this section was also calculated on the basis of 100. After data collection, the data were analyzed using SPSS software analysis, and on the basis of the type of the variables and the data descriptive statistics tests (average, standard deviation, and exponent) and analytical tests such as Pearson Correlation Coefficient (for determining the relationship between structures of HBM and oral and dental health performance among the pregnant mothers), linear regression analysis (to determine the predictive potential of structures of the HBM in adopting attitudes of oral and dental behavior among the pregnant mothers) were used.

Results

The results showed that 86.4% of mothers were aged 18–30 years, and 72.7% of them were in the 14–48th week of pregnancy. Most of the mothers (51.8%) had a high school education. The majority of mothers had insurance, were housewives, and their husbands were self-employed. (Table 1) The results indicated that the average score of the mothers on the item "information" was 46.9 ± 14.2 , and their average score on "performance to exercise oral and dental health care" was 37.5 ± 15.9 . The average scores for the items of the Health belief Model were as follows: perceived sensitivity 73.97 ± 10.89 , perceived intensity 80.30 ± 7.79 , perceived benefits 84.40 ± 7.57 , perceived obstacles 48.90 ± 9.76 , and self-effectiveness 78.29 ± 10.96 . (Table 2)

The relationship between the structures of the Health belief Model and Dental and Oral Health performance among the pregnant mothers was studied in this research. Based on the obtained results, a positive relationship was observed between awareness and performance ($P=0.04$, $R=0.19$) in the domain of prevention from tooth decay. While a reverse and significant relation-

ship was observed between perceived obstacles in relation to exercise behavior of oral and dental health care and mothers' performance ($P=0.01$, $R=-0.229$), between perceived sensitivity and performance ($P=0.3$, $R=-0.87$), between perceived intensity and performance ($P=0.4$, $R=-0.068$), between perceived benefits and performance ($P=0.8$, $R=-0.015$), and between self-effectiveness and performance ($P=0.01$, $R=-0.147$). (Table 3)

Table 1: Demographic characteristics and some of the factors related to oral health of pregnant women in Rasht

Demographic	Options	Frequency	
		Percent	Number
Pregnant mother age	Less than 18 years	2.7	3
	18–30 years	86.4	95
	Over 30 years	10.9	12
Level of education	Primary	13.6	15
	Guidance	15.5	17
	High school	51.8	57
Monthly family income	Collegiate	19.1	21
	Less than 5 million Rial	21.8	24
	5–10 million Rial	67.3	74
Insurance coverage	More than 10 million Rial	10.9	12
	Yes	89.1	98
	No	10.9	12

Table 2: Mean and standard deviation of the health belief model and practice of oral health in pregnant women in Rasht in 2015

Model structure	Standard deviation \pm mean	Max	Min
Knowledge	46.9 \pm 14.2	86.6	6.6
Perceived sensitivity	73.97 \pm 10.89	97.5	47.5
Perceived severity	80.3 \pm 7.79	99.75	62.7
Perceived benefits	84.4 \pm 7.57	100	70
Perceived barriers	48.9 \pm 9.76	72.4	21.3
Perceived self-efficacy	78.29 \pm 10.96	100	50
Performance	37.5 \pm 15.9	78.57	7.14

The mean and standard deviation of DMFT in pregnant women was 1.9 ± 2.43 , and this index had a reverse and significant relationship with awareness ($P=0.02$, $R=-0.214$), perceived sensitivity ($P=0.002$, $R=-0.291$), and perceived ben-

efits ($P=0.004$, $R=-0.273$). It, however, did not have any relationship with the remaining structures and performances.

Husbands and midwives were the most important guides of external actions of mothers to guide them toward taking an action for suitable behavior for preventing tooth decay during pregnancy.

The pregnant mothers stated that an existential guide as a self-motivating factor for encouraging health behavior can be the fear of dental decay. Linear regression analysis was used to estimate the predictive power of mothers' practice by awareness and structures of the model. Awareness ($\beta=0.382$) and the structures of the Health Belief Model, perceived sensitivity ($\beta=-0.263$) and perceived obstacles ($\beta=-0.367$), predicted 20% of the variance of the oral and dental health care behavior of the pregnant mothers. (Table 4)

Table 3: The correlation coefficient between HBM and practice of oral health care in pregnant women in Rasht in 2015

Model structure	R	P
Knowledge	0.19	0.04
Perceived sensitivity	-0.087	0.3
Perceived severity	-0.068	0.4
Perceived benefits	-0.015	0.8
Perceived barriers	-0.229	0.01
Perceived self-efficacy	0.147	0.1

Table 4: The results of the predictive Power of Awareness and Structures of the Health belief Model in performance

Regression Test	B Standardized	P	R
Knowledge	0.382	0.001	20%
Perceived sensitivity	-0.263	0.02	
Perceived severity	0.145	0.3	
Perceived benefits	-0.270	0.09	
Perceived barriers	-0.367	0.001	
Perceived self-efficacy	0.162	0.09	

Discussion

Based on the obtained results, the mothers in our case study did not have sufficient awareness regarding oral and dental health care and exhibited weak performance and practice to follow oral and dental health care. The average score for mothers' awareness was 46.9 ± 14.2 .

The average score for mothers' awareness was 3.5% for women analyzed in a case study in

Mashhad.⁽¹²⁾ A study conducted by Thomas et al. indicated that mothers had sufficient information about oral and dental health care.⁽⁶⁾ Meanwhile, Ebrahimipour et al. reported the average score of women's awareness to be 9.05, and generally 68% of the pregnant women had adequate information regarding oral and dental health care.⁽¹³⁾ One of the factors effective in this regard can be hormonal and bodily changes in the mothers' physiological conditions occurring during this period. These changes can prevent following the suitable oral and dental health care behavior by the pregnant mothers, which causes tiredness and a sick feeling.

The practice of oral and dental health care decreased in the pregnant mothers in the present case study by the perceived obstacles in this regard. In the study by Shamsi et al. this relationship was negative ($R=-0.65$) as well.⁽¹⁴⁾ In the studies by Mazloumi et al. ⁽¹⁵⁾ ($R=-0.176$) and Solhi et al. ($R=-0.43$), the perceived obstacles indicated a negative relationship with the oral and dental health care behavior among students.⁽⁸⁾

Based on the obtained results, the mean and standard deviation of DMFT in the pregnant mothers was 1.9 ± 2.43 . In the study on pregnant women by Shamsi et al. indicated that the DMFT tooth decay values in the sample and control groups were 5.8 ± 2.2 and 5.3 ± 1.8 , respectively⁽¹⁶⁾, whereas Torabi et al. reported an average DMFT index of 10.88 ± 6.47 , and the highest value of this index was observed for decay teeth and the least value was for teeth filling.⁽¹⁷⁾

As mentioned earlier, the level of tooth decay index in other studies was high. The differences observed can be related to the mothers' age in the case study. The observed differences may be also attributed to the demographic differences, which can be different in various locations because of the type of training. The status of oral and dental health care behavior in this study showed that the majority of mothers (38.2%) brushed their teeth only once a day and about 60% of them did not use dental floss. Moreover, a majority of mothers (43.6%) preferred nights for tooth brushing.

Shamsi et al. reported that a majority of mothers (43.4%) brushed their teeth once a day and 41% of them did not use dental flossing.⁽¹⁴⁾ Bamanikar et al. indicated that all women brushed their teeth twice a day.⁽¹⁸⁾ A study by Bokar et al., however,

showed that 55.8% of pregnant mothers exercised oral and dental care twice a day.⁽¹⁹⁾ Similarly, Halah et al. found that most of the mothers (73.7%) reported good habits of oral and dental health care, such as tooth brushing twice a day.⁽²⁰⁾ Martinez et al. reported that several pregnant mothers (84%) brushed their teeth two or three times a day.⁽²¹⁾

In the present study, the structures of the Health Belief Model predicted 20% variance in oral and dental health care behavior. Shamsi et al. predicted 48.6% of care variances in pregnant mothers in a study on the status of oral and dental health in pregnant mothers in Arak ⁽¹⁾, and in another study on students in Qazvin, the authors reported 16% of behavior variance.⁽²²⁾ In a study by Mazloumi et al. on students in Yazd, self-effectiveness and perceived obstacles predicted 29% of behavior variance.⁽¹⁵⁾

In the present research, we identified awareness, perceived sensitivity, and obstacles as the predicting factors, but these factors are different in different studies.

For example, in the study by Shamsi et al., self-effectiveness and perceived obstacles are the dominant factors predicting the practice of preventing behavior of oral and dental diseases; on the other hand, self-effectiveness is the most important predicting variable.⁽¹⁴⁾ In a study by Badri et al. among the variables of the Health Belief Model, self-effectiveness and perceived obstacles for using toothbrush were the predicting factors for tooth brushing. It has been also indicated that self-effectiveness for applying dental floss, perceived sensitivity, and perceived obstacles for using dental floss were the three predicting factors of using dental floss.⁽²³⁾ In a study by Karami et al., self-effectiveness was the most important predicting variable for oral and dental health care in students.⁽²⁴⁾ Therefore, we suggest that the structures of this model can be applied as a reference framework for educational intervention for educating pregnant mothers regarding oral and dental health care.

Conclusion

The results of this study indicated the efficiency of the Health Belief Model (HBM) in predicting the adoption of suitable attitudes for oral and dental health care in pregnant mothers. According to the behavior predictors, if the mothers

perceive the benefits gained from oral and dental health care behavior, overcome the preventing obstacles and factors, and have high level of self-effectiveness, they will then be able to control their behavior.

One of the limitations of the present research was that the results were obtained from pregnant mothers referring to Health Treatment Centers of Rasht. Therefore, these results cannot be generalized to all pregnant mothers, especially those mothers who refer to private dentistry offices to receive oral and dental care for severe dental problems. It is also suggested that future studies be conducted on mothers referring to private centers to gain more generalizable results.

Accordingly, this model may be used as a framework for design and implementation of training

interventions for decreasing dental decay, and with regard to the sensitivity and vulnerable status of mothers, it is essential that the efficiency of HBM be investigated in interventional studies.

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