

Predictors of Oral Health Behaviors in Female Students: An Application of the Health Belief Model

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Abstract

Background: Oral and dental health diseases can affect the general health of students.

Objectives: The aim of this study was to identify the predictors of oral and dental health behavior using the health belief model (HBM) in female students in Teheran, Iran.

Patients and Methods: This was a cross-sectional study framed by the HBM, including 400 female students living in district 5 of Tehran, Iran. The sampling technique used in this study was multi-stage stratified random sampling. The data on the HBM constructs (perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy) and demographic characteristics were collected using a self-administered questionnaire. Descriptive statistics, bivariate correlations, and linear regression were performed to analyze the data, using the SPSS software, version 18.

Results: The results showed that there were relationships between the knowledge, perceived barriers, cues to action, and mother's education with oral health behaviors. A multivariate hierarchical regression analysis was conducted with the barrier entered at step one, knowledge at step two, and cues to action at step three. Finally, the three variables accounted for 17% of the total variance in the oral and dental health behavior.

Conclusions: The current study provided evidence for the utility of the belief-based model in the prediction of oral health behaviors. It could be suggested that oral health behavior can be promoted by reducing the perceived barriers and enhancing the students' knowledge of oral and dental hygiene.

Keywords: Health Belief Model, Oral Health Behavior, Adolescent

1. Background

The world oral health report in 2003 revealed that oral health was an integral part of the overall general health (1). Several studies have indicated that oral health is related to general health both physically and psychologically, and influences different aspects of life, including growth, enjoyment, looks, speaking, chewing, tasting, and socializing, as well as an individual's feelings of social well-being (2-4). It was found that the general health has been overlooked in children, adolescents, and adults in developing countries. Moreover, oral health problems, such as dental caries and periodontitis, were prevalent in both developed and developing countries, and considered to be the most important global oral health burdens (5, 6). Oral and dental diseases are closely related to lifestyle; for example, low sugar in-

take, regular brushing, and regular dental check-ups diagnosing oral disease help to improve the general health (7, 8). Studies have revealed that an accurate understanding of these beliefs and values related to oral health behavior may be useful guides in designing effective interventions (9). In addition, it has been found that there is a relationship between the development of health-related behaviors in adolescence, and adult lifestyles, including dental health care behaviors (10).

The health belief model (HBM) was developed in the 1950s as a framework for explaining health behavior, and focusing on the individual beliefs of health behavior (11, 12). The key variables of the HBM include the perceived severity, perceived susceptibility, perceived benefits of taking action, perceived barriers to taking action, cues to ac-

tion, and self-efficacy, which can explain engagement in health-promoting behaviors (13, 14). The HBM has been applied to promote a broad range of health behaviors, such as preventive behaviors related to osteoporosis among female students (15), physical activity behavior among people with multiple sclerosis (16), and brucellosis among women (17). In addition, researchers have used the HBM to control blood glucose in type 2 diabetes, or promote health behavior in this community during treatment (18-20).

It has been determined that the collection of basic information regarding self-care behavior and perception is important in performing patient self-care during interventions. Instruments based on the HBM can explain and predict oral health habits, oral hygiene, and periodontal parameters (21).

2. Objectives

Females make up half of the world's population, and their health affects future generations; therefore, studying females' behaviors and education is of paramount importance. Females' oral health-related behaviors have tended to be neglected as a target of diagnostic or empirical research. Thus, the current study was designed to investigate the factors influencing the oral and dental health behaviors of a group of female students living in district 5 of Tehran, Iran, within the framework of the HBM.

3. Patients and Methods

3.1. Design and Participants

This was a cross-sectional study carried out in Tehran, Iran, during 2014. The HBM was used as the theoretical framework of the study, and the participants were recruited from all of the female high school students of district 5. Using multi-stage stratified random sampling, three schools were selected among the nineteen state schools, and the classes were selected randomly. A total of 400 female students took part in the study, and the data was obtained through the use of a self-administered questionnaire. The students were asked to answer the questionnaires in their classrooms, and participation in the study was voluntary.

3.2. Questionnaire

The data was collected through a nine-section self-reported questionnaire (50 items) that was obtained from the study by Mazloomi Mahmoodabad and Roohani Tanekaboni (22). The first part of the questionnaire consisted of questions related to the student's demographic characteristics and knowledge (six and ten, respectively).

The behavior-related items included four concerning oral health behavior, and each item was rated on a 4-point Likert scale ranging from 1 to 4, giving a total score of 4 to 16. Thirty of the items were designed to measure the HBM constructs, including perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy. Each item was rated on a 5-point scale using anchors between 1 and 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). The possible scores for each of the constructs ranged from 5 to 25. The cutoff points for each scale were used within the range of each scale: lower than the minimum + $0.33 \times$ range was considered low, between the minimum + $0.33 \times$ range to maximum + $0.66 \times$ range was considered to be moderate, and higher than the maximum + $0.66 \times$ range was considered to be a high level.

The questionnaires were self-administered, and the researchers provided the participants with some information regarding the research project. All of the 400 distributed questionnaires were returned, and the validity of the questionnaire was checked through a panel of experts. Using Cronbach's alpha, the reliability of the questionnaire was found to be between 0.6 and 0.7, including knowledge (0.6), behaviors (0.66), perceived susceptibility (0.77), perceived severity (0.75), perceived benefits (0.6), perceived barriers (0.73), self-efficacy (0.71), and cues to action (0.67).

3.3. Data Analysis

The data were analyzed using the statistical package for social sciences for Windows (SPSS, version 18). A Kolmogorov-Smirnov test was used to determine if the recorded data were normally distributed, and descriptive analyses were conducted for all of the variables. Bivariate correlations and a linear regression were performed to analyze the data, and all of the significant constructs of the HBM model in the linear regression analyses were considered to be independent factors. A multivariate hierarchical regression analysis was conducted, and the significance level was set at 0.05.

3.4. Ethical Considerations

The study protocol was approved by the institutional review board at the Baqiyatallah University of Medical Sciences, Tehran, Iran and written informed consent forms were obtained from all of the participants involved in this study.

4. Results

A total of 400 female students were included in this study. There were 250 (63.9%) students who always used

toothbrushes, 175 (44.8%) of the participants used fluoride toothpaste, and 18 (4.6%) did not brush their teeth before going to bed (Table 1). The results of this study showed that most of subjects were 16 year old, in second grade, and in an experimental field. In addition, most of the parents had academic educations. Moreover, the results also revealed that while the subjects had moderate knowledge, behavior, cues to action, and self-efficacy, the perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were high (Table 1).

Table 2 shows the correlations among the constructs of the model for the oral and dental health behavior, and descriptive statistics for the variables for the theoretical constructs. All of the variables presented significant bivariate associations with oral health behavior, with perceived barriers ($r = 0.31$) showing the highest correlation. The results of the regression analysis between the oral health behaviors on the selected demographic predictors and the HBM constructs among the female students are shown in Table 3.

According to the results, the knowledge, perceived barriers, cues to action, and mother's education showed positive relationships with oral health behaviors. All of the significant constructs of the HBM model in the linear regression analyses were considered as independent factors. Moreover, a multivariate hierarchical regression analysis was conducted with the perceived barriers entered at step one, knowledge at step two, and cues to action at step three (Table 4). Overall, the three variables, including the perceived barriers, knowledge and cues to action, accounted for 17% of the total variance in the oral and dental health behavior. At step one, the barrier variables were found to account for 10% of the variance in the oral and dental health behavior ($P < 0.001$). At step two, the inclusion of the knowledge variables increased the R^2 significantly, and explained 16 percent of the variance in the oral and dental health behavior ($P < 0.001$). However, in the third step, the inclusion of the cues to action increased the multiple R^2 significantly (R^2 adjusted 17%, $P < 0.048$).

There were several different reasons related to the barriers to oral and dental health behavior. In summary, the most important impediments were eating sweet foods, such as chocolates and candies ($n = 126$, 33.1%). In addition, 15.7% reported fears of injections and dentist visits ($n = 60$) as the factors influencing them. The most significant cues to action were found to be family members (39.7%) and peer recommendations (35.3%).

5. Discussion

The present study was designed to investigate the predictors of oral and dental health behavior among female

students within the framework of the HBM. The findings from this study showed that there was a moderate level of oral and dental health behaviors, such as regular brushing, flossing, and using fluoride. The findings of one study carried out in India indicated that 25% of the participants brushed their teeth more than one time daily. However, half of them had dental and gum health problems (23).

The results of this study revealed that the parents' education level was associated with the oral and dental health behavior. Consistent with our findings, another study has reported that there was a significant correlation between the level of education of the parents and the incidence of caries (24). It was found that the parent/caregiver, usually the mother, plays a role in preventing the incidence of dental caries, and the performance of preventive healthcare behaviors in children (25, 26). Van den Branden et al. noted that a lower educational level of the mother was related to a higher consumption of sugared drinks between meals, and to a lower brushing frequency and dental attendance in the child (27). It seems that the higher education of the parents affects the children's oral and dental health behaviors.

Another important factor was the perceived barriers, which were related to oral and dental health behavior. The perceived barriers are the most important and strongest determinants of the HBM dimensions across the various study designs and behaviors (28, 29). For example, the fear of injections and dentist visits was mentioned by 60 (15.7%) of the participants as an oral and dental health behavior barrier. Similarly, other studies have shown that the fears of needles or dental injections have been revealed as potential barriers to poor oral health and the utilization of dental care (30, 31). The high cost of dental visits was shown to be a barrier to regular visits to the dentist, which is consistent with the findings of previous studies (32).

The next factor predicting the oral and dental health behavior of the participants was the knowledge and awareness of oral and dental hygiene. The results of some studies have revealed that one of the essential elements for oral self-care behaviors is knowledge about oral health (33). Furthermore, it was found that the higher prevalence of dental disease was related to the lack of dental awareness (34).

According to the findings of this study, all of the constructs of the HBM accounted for 17% of the oral and dental health behavior. This indicated that factors other than ones perceived influence on oral health behaviors, such as environmental and non-behavior elements, should be investigated in the future. The limitations of this study include: the references could be used for the generalization of the findings, the explanatory nature of the study rendered examining the causal relationships among the variables impossible, the exclusion of the DMFT, it was cross-

Table 1. The Characteristics of the Study Sample^a

Variable	No. (%)
Age, y	
≤ 15	85 (28.1)
16	128 (42.4)
≥ 17	89 (29.5)
Grade	
First	168 (42.7)
Second	202 (51.4)
Third	23 (5.9)
Education fields	
Mathematics	92 (31.9)
Experimental	165 (57.3)
Humanities	31 (10.8)
Father's education	
Lower diploma	29 (7.4)
Diploma	127 (32.5)
Academic education	235 (60.1)
Mother's education	
Lower diploma	41 (10.5)
Diploma	157 (40.2)
Academic education	193 (49.4)
Knowledge	
Low	91 (23.3)
Moderate	149 (38.1)
High	151 (38.6)
Behavior	
Low	63 (16.1)
Moderate	179 (45.8)
High	149 (38.1)
Perceived susceptibility	
Low	8 (2.1)
Moderate	83 (21.4)
High	297 (76.5)
Perceived severity	
Low	18 (4.7)
Moderate	108 (28.1)
High	258 (67.2)
Perceived benefits	
Low	16 (4.2)
Moderate	168 (43.8)
High	200 (52.1)
Perceived barriers	
Low	167 (43.6)
Moderate	126 (32.9)
High	90 (23.5)
Self-Efficacy	
Low	36 (9.4)
Moderate	161 (42.0)
High	186 (48.6)
Cues to action	
Low	128 (33.2)
Moderate	153 (39.7)
High	104 (27.0)

^a n = 400.

Table 2. Pearson's Correlation Matrix Between Oral Health Behavior (Dependent Variable) and the Independent Variables Studied^a

Variable	1	2	3	4	5	6	7	8
1. Knowledge	1							
2. Behavior	0.27 ^b	1						
3. Perceived susceptibility	0.32 ^b	0.24 ^b	1					
4. Perceived severity	0.19 ^b	0.18 ^b	0.54 ^b	1				
5. Perceived benefits	0.22 ^b	0.15 ^b	0.59 ^b	0.59 ^b	1			
6. Perceived barriers	0.15 ^b	0.31 ^b	0.08 ^b	0.03	-0.02	1		
7. Self-Efficacy	0.12 ^b	0.28 ^b	0.39 ^b	0.45 ^b	0.39 ^b	0.18 ^b	1	
8. Cues to action	-0.02	0.11 ^b	0.18 ^b	0.27 ^b	0.29 ^b	-0.11 ^b	0.39 ^b	1
Mean ± SD	6.6 ± 1.8	12.3 ± 2.5	21.7 ± 3.0	20.9 ± 3.4	20.0 ± 3.1	16.6 ± 4.7	19.5 ± 3.7	1.9 ± 0.7

^an = 400.^bP value lower than 0.01.**Table 3.** The Results Obtained From the Multiple Linear Regression Analysis Indicating Risk Factors for Oral Health Behaviors^{a,b,c}

Variables	B	Standard Error	t	P Value
Grade				
First	-0.723	0.736	-0.983	0.327
Second	-1.154	0.641	-1.800	0.073
Third	Reference category			
Education fields				
Mathematics	-0.519	0.564	-0.922	0.358
Experimental	-0.051	0.461	-0.111	0.912
Humanities	Reference category			
Mother's education level				
Lower diploma	-1.043	0.501	-2.083	0.039
Diploma	0.111	0.320	0.347	0.729
Academic education	Reference category			
Perceived susceptibility	0.088	0.076	1.151	0.251
Perceived severity	-0.009	0.066	-0.133	0.894
Perceived benefits	-0.123	0.069	-1.782	0.076
Perceived barriers	0.158	0.035	4.453	0.000
Self-Efficacy	-0.097	0.061	-1.588	0.114
Cues to action	0.104	0.042	2.499	0.013
Age	-0.057	0.255	-0.224	0.823
Knowledge	0.276	0.094	2.936	0.004

^an = 400.^bDependent variable: oral health behavior.^cR²=0.180, Adjusted R²=0.164.

sectional, and the design of the study was self-reporting.

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Table 4: Hierarchical Linear Regression Analysis for Predicting Oral Health Behavior as the Dependent Variable^a

Predictor	R ²	R ² Adjusted	Regression Coefficient (β)	P Value
Step 1	0.10	0.09		
Perceived barriers			-0.31	0.001
Step 2	0.161	0.157		
Perceived barriers			-0.26	0.001
Knowledge			0.25	0.001
Step 3	0.170	0.164		
Perceived barriers			-0.28	0.001
Knowledge			0.25	0.001
Cues to action			0.09	0.048

^an = 400.

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Footnote

Authors' Contribution: Fatemeh Rahmati-Najarkolaei designed the study and Parvin Rahnama helped the main investigator to analyze the data and provided the final draft. Mohammad Gholami Fesharaki contributed to the analysis and Vahid Behnood designed the study and collected the data. All of the authors read and approved the final version of the manuscript.

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