http:// ijp.mums.ac.ir
Original Article (Pages: 2069-2077)

Predicting Oral Health Behavior using the Health Promotion Model among School Students: a Cross-sectional Survey

Abdurrahman Charkazi[1], Rahman Berdi Ozouni- Davaji [2], Danial Bagheri [3], Morteza Mansourian[4], Mostafa Qorbani[5, 6], Omid Safari[7], Babak Rastgari Mehr[8], *Kamal Mirkarimi [1]

[1]Assistant Professor, Ph.D of Health Education and Promotion, Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, Iran. [2]Ph.D Candidate of Counseling, Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, Iran. [3]PhD Candidate of Social Sciences Researcher, Vice Chancellor for Research and Technology, Golestan University of Medical Sciences, Gorgan, Iran. [4]Department of Health Education and Promotion, School of health, Iran University of Medical Sciences, Tehran, Iran. [5]Departments of Community Medicine, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran. [6]Non-Communicable Diseases Research Center, Endocrinology and Metabolism Research Institute, Tehran, Iran. [7]Departments of Pediatrics, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran. [8]Msc, Abadan School of Medical Sciences, Abadan, Iran.

Abstract

Background: The mean of DMFT (D=decayed teeth or untreated caries, M=missing teeth, F=filled teeth and T=permanent teeth) has been increasing from 1957 to 2015 years in Iran. The current survey aimed to test the power of health promotion model for predicting the oral health behavior among high-school students.

Materials and Methods: A cross-sectional study was conducted on 482 high school students in Gorgan city, Iran. Multi-cluster sampling was used to recruit the samples. A researcher-made questionnaire based on HPM was implemented to collect data. To analyze, SPSS-18 and statistical tests, including t-test, Pearson correlation coefficient and univariate and multivariate regression models were used.

Results: A total of 482 high-school students including 255 (52.9%) male and 227 (47.1%) with mean age of 16.02 ± 0.5 were investigated. The highest and lowest prevalent positive oral health behavior were tooth brushing (73%) and using fluidized oral irrigator (3.6%), respectively. Except for perceived barriers (with negative correlation), all constructs of HBM were positively related to oral health behaviors. Self-efficacy was the strongest predictor of oral health behavior (β=0.653) (r=0.541, P<0.05).

Conclusion: HPM seems likely beneficial to design and develop oral health behaviors among students. Self-efficacy and perceived benefits should also be noticed to promote students oral health behaviors.

Key Words: Dental Carries, Health Behavior, Health Promotion, Self-Efficacy, Students.

*Please cite this article as: Charkazi A, Ozouni- Davaji RB, Bagheri D, Mansourian M, Qorbani M, Safari O, et al. Predicting Oral Health Behavior using the Health Promotion Model among School Students: a Cross-sectional Survey. Int J Pediatr 2016; 4(7): 2069-77.

Corresponding Author:

Kamal Mirkarimi , Assistant Professor, Ph.D of Health Education and Promotion, Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, Iran. Fax: +981732421657.

Email: ak.mirkarimi@gmail.com

Received date Mar 13, 2016; Accepted date: Jun 05, 2016

1- INTRODUCTION

Oral disease is strongly related to lifestyle. Health promoting lifestyles include infrequent sugars consumption, tooth brushing effectively and regularly and visiting a dentist regularly to prevent and detect oral disease (1). Oral health is basically different from healthy teeth that include oral soft tissues, muscles for chewing, the tongue, palate, lips and salivary glands as well as health of the gums (2). Good oral health has been a main concern of dental health promotion (3). The pattern of oral diseases has globally been changed over the past three decades such that periodontal diseases and dental caries have been reducing among children in the vast majority of developed countries (4). The aforementioned changes are likely caused by changing lifestyle, planned and routine self-care programs, oral health services and conducting school-based oral health care programs; while, this trend has not been observed in developing countries, and dental caries are especially existed among children (4).

Children suffering from poor oral health are 12 times more likely restricted in school-based activity such as absence in school sessions than children with good oral health (5). The findings of epidemiology of dental health status are presented often in the form of filling, missing and decayed teeth in permanent teeth (DMFT) or in milk teeth (dmft)(6).

The mean of DMFT (D=decayed teeth or untreated caries, M=missing teeth, F=filled teeth and T=permanent teeth) has been increasing from 1957 to 2015 years in Iran. According to the World Health Organization (WHO) records, DMFT mean was moderate among 12 years old children in Iran in 1993 year (7). In overall, 13.8% and 11.5% of 6 and 9 year old children have deciduous and permanent teeth and 50% of 12 years children have approximately faced by caries (8).

Oral health is mainly influenced by a complex interaction of many factors that include socio-economic, biological and environmental factors as well as knowledge, attitude, behavior and, in final, availability of health services (4).

Health behavior models provide beneficial methods to the providers of oral health care to consider effective client-based behavior. Theories introduce systematic explanations in terms of objective facts (9). Then, conducting health behavior models and theories is considerably useful for identifying the determinant factors of oral health behaviors to make useful plans by planners and health care providers, in brief, to achieve effective community-based interventions.

The Health Promotion Model (HPM) of Pender is one of the most predictive and comprehensive patterns of health promoting behaviors that provides theoretical framework to achieve determinant factors of health promoting behavior. HPM has been regarded as a framework to explain the lifestyle behaviors (10). This model also studies other important factors of person behavior including situational effects, interpersonal relation and previous experiences related to the behavior (11) that seems likely beneficial to survey oral health behavior. The developed HPM derived from the Social Cognitive Theory (SCT) (12) consists of 3 factors that are proposed to impact on health promoting behaviors:

a) people characteristics and experiences,
b) behavior cognitions, and
c) behavioral health outcomes.

This model has been applied in numerous studies predicting physical activity behaviors, use of hearing protection and quality of life in chronic condition (13-18). To the best of our knowledge, there are just two studies investigated the oral health behavior using HPM including Morowatisharifabad and Shirazi in Yazd

city- Iran (19) and Vakili in Shahrekord city-Iran [4], as the model has not yet been well tested the oral health behavior in the country, so we aimed to explore the determinants factors of oral health behavior using HPM.

2- MATERIALS AND METHODS

2-1. Study design and procedure

A cross-sectional survey was done between October 2015 and December 2015. Samples were selected from all high schools in Gorgan city, North of Iran. The study protocol was approved by Golestan University of Medical Science (ID-number: 92070991). Students were asked to complete questionnaire under supervision of their teachers. Samples were firstly selected from all existed high schools in the city based on cluster sampling method, and the study high schools were secondly chosen using simple random sampling. Sample size was separately considered for male and female students. Prior to the study, all students were told that the current findings would be confidential. The purpose of the study was explained to subjects; moreover, informed consent was obtained from all participants. Eighteen students did answer questions partially, then they were excluded from the investigations; finally 482 questionnaires were completed returned and analyzed 255 (52.9%) male and 227(47.1 %) female, yielding a response rate of 96.4 %.

2-2. Inclusion and exclusion criteria

The inclusion criteria were consisted of being high-school students and being satisfied to participate in the study. The exclusion criterion was just partial completion of the questionnaire. In total, 482 eligible students were included in the survey.

2-3. Sample size

According to a related study (4), d= 1, confidence interval 95% and S= 10, 500 samples were considered (250 female and 250 male student). The sample size formula was as follow:

$$n = \frac{Z_{1-\alpha/2} \cdot P(1-P)}{d^2}$$

2-4. Instrument

A researcher-made and structured questionnaire was developed and conducted based on the HPM constructs in nine parts:

1) Demographic characteristics, 2) oral health behaviors, 3) perceived benefits, 4) perceived barriers, 5) perceived self-efficacy, 6) activity related affect, 7) interpersonal influences, 8) situational influences, and 9) commitment to an action plan.

All constructs of the model, except for commitment to an action plan, were scored based on 3-point Likert scale (0= not at all, 1= somewhat, 2=completely). Total scores ranged from 0 to 3 that higher scores recommending greater oral health behavior or commitment to an action plan. Commitment to an action plan was also scored as yes or no (yes=1 and no=0).

Our search yielded no associated questionnaires, and then a new one was developed by the current researchers. The face validity of the questionnaire was confirmed by 4 specialists and content validity by 12 specialists. The content validity rate and content validity index were finally assessed. Prior to the survey, a pilot study was executed to examine the eligibility of the questionnaire and also to determine the probable problems with the instrument. The current questionnaire was pilot-tested with 45 students, and this pilot subjects was not included in the final study sample. The questionnaire reliability was tested using internal homogeneity and Cronbach's alpha. The highest and lowest Cronbach's alphas were for perceived

benefits (0.88) and situational influences (0.62), respectively. Cronbach's alphas for oral health behavior, interpersonal influences, perceived self-efficacy, activity-related affect, perceived barriers and commitment to a plan of action, were 0.64, 0.68, 0.71, 0.79, 0.78 and 0.85 respectively.

2-5. Variable definition

General characteristics included gender (classified into male and female), father's education and mother's education (categorized into five subscales: illiterate, primary, high school, diploma, academic).

2-6. Statistical analyses

Descriptive analysis was utilized to explain the mean and standard deviation of the demographic characteristics. T-test and One-way ANOVA were conducted to test HPM constructs. A Pearson's correlation coefficient was implemented to reveal associations between oral health behavior and the HPM constructs. To describe the variation in oral health behavior scores based on HPM variables, linear regression analysis was run.

3- RESULTS

In overall, 482 questionnaires were completed and returned. The mean age of students was 16.02 ± 0.5 in total. Male students 255 (52.9%) were more than female samples 227 (47.1%). The demographic characteristics of all students are reported in the (**Table.1**). Subjects who performed oral health behaviors were as follows: checking by a dentist twice a year (5%), tooth brushing (73%), using dental floss (20.6%), and using fluidized oral irrigator (3.6%). The students presented that the following individuals (interpersonal influences) persuade them to do oral health behaviors: fathers (n=138, 47%), mothers (n=211, 61%), teachers (n=93, 29 %), siblings (n=118, 31.8%) and peers (n=32, 11.9%). Furthermore, students pointed that, 27% of their fathers, 43% of their mothers and 36% of their siblings implement oral health behaviors. Pearson's correlation showed that, there were statistically significant positive correlations between oral health behaviors and all Health Promotion Model constructs (**Table.2**).

Perceived benefits (r=0.312; P=0.001), perceived self–efficacy (r=0.541; P=0.001), activity–related effects (r=0.437; P=0.001) and commitment to an action plan (r= 0.191; P=0.05) were positively associated with oral health behaviors; while, a negative relation was found between oral health behaviors and perceived barriers (r= -0.276; P=0.001). Perceived self-efficacy had the highest correlation with oral health behaviors. Univariate and multiple linear regression models were utilized to explain the variation in oral health behavior based on HPM constructs. All constructs of the HPM predicted the oral health behavior of students when they were separately entered in the model. While, after adjustment, four of them, entitled perceived self-efficacy (P = 0.001), perceived benefits (P = 0.028), perceived barriers (P = 0.041) and commitment to a plan of oral health behaviors (P = 0.002) were able to significantly predict the student's oral health behaviors (**Table.3**).

T-test revealed significant differences in oral health behaviors, activity–related affects, perceived self–efficacy and perceived benefits as well as barriers by gender (**Table.4**). Significant statistical differences were also found between the oral health behavior with father's education (P=0.026) and mother's education (P=0.031) conducting one–way ANOVA. Post hoc tests also showed that students with parents educated in high school, diploma and academic education implement oral health behaviors meaningfully higher than those with parents educated in primary education and illiterate (P<0.05).

Table-1: Demographic characteristics of the students

Age (mean and standard deviation)	16.02 ± 0.5	
Gender	Number	Percent
Male	255	52.9
Female	227	47.1
Father's education		
Illiterate	26	5.4
Primary school	137	28.4
High school	129	26.7
Diploma	107	22.3
Academic	83	17.2
Mother's education		
Illiterate	57	11.8
Primary school	173	36
High school	167	34.6
Diploma	43	8.9
Academic	42	8.7

Table- 2: Pearson correlation between HPM constructs and oral health behavior

	Constructs	1	2	3	4	5	6	7	8
1	Perceived self-efficacy								
2	Activity-related affect	0.437**							
3	Perceived benefits	0.312**	0.489**						
4	Perceived barriers	-0.276**	-0.301**	-0.271**					
5	Interpersonal influences	0.329**	0.351**	0.237**	-0.169**				
6	Situational influences	0.118**	0.077	0.181**	-0.004	0.203*			
7	Commitment to a plan of oral health behaviors	0.191*	0.212*	0.241**	-0.131*	0.163*	0.096		
8	Oral health behaviors	0.541**	0.431**	0.408**	-0.324**	0.427**	0.218**	0.311**	

* P-value < .05; **P-value <.001.

Table-3: Predicting oral health behavior based on the HPM constructs using adjusted and unadjusted regression model

Predictors	Un-standardized (Univariate)		Standardized (Multivariate)	
	B	P-value	β	P-value
Interpersonal modeling	0.23	0.041	0.031	0.561
Interpersonal norms	0.41	0.044	0.082	0.107
Positive affects	0.19	0.021	0.219	0.087
Negative affects	0.21	0.037	0.175	0.063
Perceived self-efficacy	0.87	0.001	0.653	0.001
Situational influences	0.53	0.028	0.072	0.134
Perceived benefits	0.65	0.001	0.315	0.028
Perceived barriers	-0.36	0.001	-0.226	0.041
Commitment to a plan of oral health behaviors	0.16	0.001	0.011	0.002

B= Unadjusted; β= Adjusted.

Table-4: Comparison of HPM constructs and oral health behavior based on gender

Variables		Male (n=255) Mean (SD)	Female (n=227) Mean (SD)	P-value
Oral health behavior		13.24 (4.9)	14.02 (4.3)	0.003
Activity-related affect	Positive affects	16.34 (3.7)	17.65 (3.5)	0.003
	Negative affects	5.87 (3.2)	5.01 (2.1)	0.001
Interpersonal influences	Interpersonal modeling	8.23 (1.7)	8.48 (1.5)	<0.05
	Interpersonal norms	12.41 (2.6)	12.65 (2.4)	<0.05
Perceived self-efficacy		11.08 (5.3)	11.89 (4.8)	0.001
Perceived benefits		28.32 (5.7)	29.79 (4.7)	0.017
Perceived barriers		16.31 (3.2)	14.76 (2.8)	0.036
Situational influences		1.67 (0.6)	1.77 (0.4)	0.042
Commitment to a plan of oral health behavior		1.43 (0.6)	1.49 (0.4)	0.046

SD= Standard Devietion.

4- DISCUSSION

In the current survey we tested the relation of HPM constructs and oral health behaviors. We explored more boys than girls that is not associated with other studies conducted in Iran (4, 19), although this difference is not so obvious. The vast majority of students brush their teeth regularly (73%). While, the lowest frequency in oral health behaviors was for fluidized oral irrigator (3.6%) and referring to dentist twice a year (5%). In a study conducted in Guangzhou, Southern China (20), brushing teeth was twice a day or more (32.7%) and visiting dentists regularly for check-ups was (14.9%) that also was relatively low like our survey.

Then, in addition to tooth brushing, oral health education is strongly required in terms of other educations such as the benefits of visiting dentist or dental floss.

It may likely more beneficial to use the dentist as role model to educate these students. In this investigation, 20.6% of students used dental floss, while in a survey conducted in Shahrekord only 15% of samples used dental floss, in a Swedish (21) and a Turkish study (22), more than 50% of teenagers and 32.3 % of students did this behavior, respectively. Performance of dental floss in our country is greatly low compared to the developed countries, it might be caused by the fact that people are poorly provided by knowledge and attitude regarding this oral health behavior. As shown in (Table.2), the self-efficacy variable was significantly correlated with all of HPM constructs that is in relevance with other studies (17, 19, 23). It showed in several explorations that self-efficacy is an effective factor to change behavior (24-26).

Therefore, education toward oral health behavior by focusing on self-efficacy may be more useful to promote some of current poor behaviors including dental floss or visiting dentists. With regards to the perceived barriers, our result was look exactly like other studies conducted by Vakili et al. (4) and Morowatysharifabad et al. (19) with these findings that self-efficacy was negatively correlated with perceived barriers.

It noted that students with high self-efficacy can more effectively cope with the problem that named perceived barriers. The predictive power of the HBM regarding oral health behavior was investigated by entering all the constructs of the HBM in the regression model using the backward regression model, separately. The findings revealed that all the HBM constructs had a significant relationship with oral health behavior. In the second

step, self-efficacy (P = 0.001), perceived benefits (P = 0.028), perceived barriers (P = 0.041) and commitment to a plan of oral health behaviors (P = 0.002) were able to significantly predict the student's oral health behaviors using an adjusting model. Self-efficacy was the most powerful predictor of oral health behavior (β = 0.653), followed by perceived benefits (β = 0.315), perceived barriers (β = - 0.226) and commitment to a plan of oral health behaviors (β = 0.011).

In total, 86% of the studies exploring health promotion model reported the significance of self- efficacy as a leading factor of health promotion (11). In the vast majority of studies conducted on health promotion behaviors, self- efficacy is the strongest predictors of intention and behavior (11, 25, 27). The average score of oral health behavior was 13.72 ± 4.41. In a survey implemented in Iran (19), the aforementioned mean score was 13.05 ± 3.67 that female students reported a better performance toward oral health behaviors than the boys, which is in line with the current findings. According to numerous studies, females usually had better performance in the field of oral health care than boys (4, 19, 28, 29). Then, it seems likely beneficial to more consider the school-based or community-based education focusing on gender role to enhance the oral health behavior among male students.

4-1. Limitations of the study

Responses accuracy may be likely affected by numerous constructs and consequently many questions that resolved by explaining the aim of the study to the participants.

5. CONCLUSION

The self-efficacy and perceived benefits were the most powerful predictors of oral health behaviors that suggests to design and develop group-specific interventions for students, also education toward benefits of commitment to a regular plan of oral health behavior must be regarded. It is also recommended that the HPM apply as a framework for developing effective oral health interventions in the country.

6- CONFLICT OF INTEREST: None.

7- ACKNOWLEDGEMENT

Authors wish to thank the students who took part in the survey and Golestan University of Medical Science for its financial support.

8- REFERENCES

1. Al-Ansari J, Honkala E, Honkala S. Oral health knowledge and behavior among male health sciences college students in Kuwait. BMC Oral Health 2003;3(1):2.

2. Organization WHO. Oral health promotion: an essential element of a health-promoting school. 2003. Available at: http://www.who.int/iris/handle/10665/70207.

3. Sgan-Cohen HD. Oral hygiene improvement: a pragmatic approach based upon risk and motivation levels. BMC Oral Health 2008;8(1):31.

4. Vakili M, Rahaei Z, Nadrian H, YarMohammadi P. Determinants of oral health behaviors among high school students in Shahrekord, Iran based on Health Promotion Model. American Dental Hygienists Association 2011;85(1):39-48.

5. Offices UGA. Oral health: dental disease is a chronic problem among low-income populations. Washington, DC: Report to Congressional Requesters. 2000. Available at: http://www.scielosp.org/scielo.php.

6. Shooriabi M, Zareyee A, Gilavand A, Mansoori B, Keykhaei Dehdezi B. Investigating DMFT Indicator and its Correlation with the amount of Serum Ferritin and Hemoglobin in Students with Beta-thalassemia Major in Ahvaz, South West of Iran. International Journal of Pediatrics 2016;4(3):1519-27.

7. Mahmoodabad SM, Tanekaboni NR. Survey of some related factors to oral health in

high school female students in Yazd, on the basis of health behavior model (HBM). Journal of Birjand university of medical sciences 2008;15(3):40-7.

8. Pakshir HR. Dental education and dentistry system in Iran. Medical Principles and Practice 2003;12(Suppl. 1):56-60.

9. Hollister MC, Anema MG. Health behavior models and oral health: a review. American Dental Hygienists Association 2004; 78(3): 6.

10. Chamberlain B. Health promotion in nursing practice. Clinical Nurse Specialist 2007;21(2):130.

11. Kamran A, Azadbakht L, Sharifirad G, Mahaki B, Mohebi S. The relationship between blood pressure and the structures of Pender's health promotion model in rural hypertensive patients. Journal of education and health promotion 2015;4(29):1-8.

12. Pender N, Murdaugh C, Parsons M. The health promotion model. Health promotion in nursing practice 2002;4:59-79.

13. Taymoori P, Niknami S, Berry T, Ghofranipour F, Kazemnejad A. Application of the health promotion model to predict stages of exercise behaviour in Iranian adolescents. 2009. Available at: http://www.who.int/iris/handle/10665/117752.

14. Kerr MJ, Lusk SL, Ronis DL. Explaining Mexican American workers' hearing protection use with the health promotion model. Nursing research 2002;51(2):100-9.

15. Lusk SL, Ronis DL, Kazanis AS, Eakin BL, Hong O, Raymond DM. Effectiveness of a tailored intervention to increase factory workers' use of hearing protection. Nursing research 2003;52(5):289-95.

16. Ronis DL, Hong OS, Lusk SL. Comparison of the original and revised structures of the health promotion model in predicting construction workers' use of hearing protection The contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIOSH. 2006. doi: 10.1002/nur.20111.

17. Wu TY, Pender N. Determinants of physical activity among Taiwanese adolescents: An application of the health promotion model. Research in nursing & health 2002;25(1):25-36.

18. Wu T-Y, Pender N, Noureddine S. Gender differences in the psychosocial and cognitive correlates of physical activity among Taiwanese adolescents: a structural equation modeling approach. International journal of behavioral medicine 2003;10(2):93-105.

19. Morowatisharifabad M, Shirazi KK. Determinants of oral health behaviors among preuniversity (12th-grade) students in Yazd (Iran): an application of the health promotion model. Family & community health 2006;30(4):342-50.

20. Qiu RM, Wong MC, Lo EC, Lin HC. Relationship between children's oral health-related behaviors and their caregiver's sense of coherence. BMC public health 2013;13(1):239.

21. Hoerup N, Poomviset N, Prommajan J, Watanapa A. Oral health status and oral health behaviour of urban and rural schoolchildren in Southern Thailand. International Dental Journal 2001;51(2):95-102.

22. Peker I, Alkurt MT. Oral health attitudes and behavior among a group of Turkish dental students. European journal of dentistry 2009;3(1):24.

23. Resnick B. Testing a model of exercise behavior in older adults. Research in nursing & health 2001;24(2):83-92.

24. Greaney ML, Lees FD, Blissmer BJ, Riebe D, Clark PG. Psychosocial Factors Associated With Physical Activity in Older Adults. Annual Review of Gerontology and Geriatrics 2016;36(1):273-91.

25. Mirkarimi K, Mostafavi F, Eshghinia S, Vakili MA, Ozouni-Davaji RB, Aryaie M. Effect of Motivational Interviewing on a Weight Loss Program Based on the Protection Motivation Theory. Iranian Red Crescent Medical Journal 2015;17(6): e23492.

26. Brodie DA, Inoue A, Shaw DG. Motivational interviewing to change quality of life for people with chronic heart failure: a

randomised controlled trial. International journal of nursing studies 2008;45(4):489-500.

27. Breaux-Shropshire TL, Brown KC, Pryor ER, Maples EH. Relationship of blood pressure self-monitoring, medication adherence, self-efficacy, stage of change, and blood pressure control among municipal workers with hypertension. Workplace health & safety 2012;60(7):1-18.

28. Al-Ansari JM, Honkala S. Gender differences in oral health knowledge and behavior of the health science college students in Kuwait. Journal of allied health 2007;36(1):41-6.

29. Al-Omari Q, Hamasha A. Gender-specific oral health attitudes and behavior among dental students in Jordan. J Contemp Dent Pract 2005;6(1):107-14.