The Effects of Trans-Theoretical Model and Fear of Dental Care on Dental Cleaning Behavior among Students

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Abstract

Background: Fear of dental care prevents dental cleaning behavior and increases the prevalence of dental caries. This study was conducted to determine the effect of Trans-Theoretical Model constructs and fear of dental care on the dental cleaning behavior of students.

Materials and Methods: This cross-sectional study was carried out in Sanandaj city, Iran, in 2017. Using multi-stage sampling, 1,344 male and female students were included in the study. They completed a self-report questionnaire, including demographic information, Trans-Theoretical Model constructs and fear of dental care. Data were analyzed using SPSS software (version 22.0).

Results: A total of 1,344 male and female students with a mean age of 15.22 ± 2.64 years participated in the study; from the perspective of students, dental caries (88.4%) was the most frequent illness and tongue inflammation (0.6%) was the least frequent disease. Overall, 32.9% of the students used no tools for cleaning their teeth. Fear of dental care and perceived barriers were reduced significantly during the stages of dental cleaning behavior ($p<0.05$) and perceived self-efficacy and perceived benefits were significantly increased ($p<0.001$). The odds of dental cleaning behavior increased with self-efficacy (OR=1.34, 95%CI=1.22-1.48, $p<0.05$), and decreased with fear of dental care (OR=0.90, 95%CI=0.80-0.98, $p<0.01$).

Conclusion: The findings showed dental cleaning behavior among students was at a low level and various factors such as perceived self-efficacy, benefits and barriers and fear of dental care influenced its performance.

Key Words: Behavior, Fear, Oral Health, Students, Trans-Theoretical Model.

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1- INTRODUCTION

Oral health is a state of oral structure and tissue that helps the physical, mental and social well-being of people, through which they will be able to talk, eat and socialize (1). Despite the many advantages of oral health in the health of the whole body, more than 99% of people in the society still suffer from oral diseases (2). Disregarding oral health disturbs social relations and performance, voice quality and talking and causes pain and anxiety (3). Studies have documented a very low incidence for dental cleaning behavior (4, 5). On the other hand, studies have reported fatigue, lack of a plan for dental care, non-priority of tooth brushing, lack of skill in brushing and flossing (6, 7), insignificance of oral diseases (8), lack of knowledge and fear as barriers to dental cleaning behavior (9).

Fear of dental care is a concept that an individual encounters while doing the behaviors related to the maintenance and promotion of oral health (10). This fear is associated with a number of oral health disorders and behaviors such as avoidance of dental care and improper hygiene (11). Use of tooth brush, mouthwash, dental floss and toothpick has been reported to be very low among the people suffering from fear of dental care, which affects their health beliefs and practices (12). This fear is caused by factors such as gingival bleeding, dental impairment (7), prior experiences and assumptions and fear of brushing (13). Akbay et al. (14), Taani et al. (15), Olak et al. (16), and Fallahi et al. (17) have reported fear of care as a factor increasing dental caries. The mean fear of dental care has been reported to be 33.29 in the male and 31.84 in the female Iranian students (total score 15-75) (18). Fear of dental care discourages the use of dental cleaning tools that are associated with behavior training and behavior change (13). One of the effective models in the field of changing the behaviors related to oral health is Trans-Theoretical Model. It was designed by Prochaska and DiClemente, 1983, and includes four constructs: stages of change (pre-contemplation, contemplation, preparation, action and maintenance), balance of decision (perceived benefits and perceived barriers), processes of change and self-efficacy. This model has been used in studies conducted to investigate the effect of training on stages of dental behavior (19), oral self-care behavior (20), and tool development (21). Although the studies performed based on this model have mentioned barriers such as gingival bleeding, forgetfulness, insignificance of behavior, etc. (19, 21, 22), they have not embarked on analyzing the association of fear of dental care (as a separate variable) with stages of behavior change, self-efficacy and perceived barriers and benefits of dental cleaning behavior based on this model.

Therefore, we addressed the following questions in our study: "In which stage of dental cleaning behavior are the students with fear of dental care located?", "How is fear of dental care correlated with self-efficacy and perceived barriers and benefits?" and "Does fear of dental care predict the dental cleaning behavior?"

In view of the high prevalence of dental caries in people with extreme fear, the importance of oral health in the students (13), the role of using interdental cleaning devices in reducing the periodontal diseases and dental caries (19), the termination of dental caries improvement among the youth (23), the critical global increase of dental caries (24), and the limitations of studies conducted on the correlation of fear of dental care with Trans-Theoretical Model constructs, the current study aimed to explore the effect of Trans-Theoretical Model constructs and fear of dental care on dental cleaning behavior among Iranian high school students.

2- MATERIALS AND METHODS

2-1. Study design and population

This cross-sectional study was performed on the male and female high school students of Sanandaj city, Kurdistan province, Iran, in 2017.

2-2. Methods

Using the sample size formula $n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 p(1-p)(DEFF)}{d^2}$ ($Z_{\alpha/2}$= 96, 1.d= 0.25, p=20%, $DEFF = 1 + (m-1)\rho$) the sample size was estimated to be 672 students, and finally 1,344 students were included in the study by assuming the design effect equal to two. The samples were chosen by multistage sampling. In the first stage, 30 high schools were selected from among the 84 existing schools. In the second stage, several classes were selected from each school, and commensurate with the size of each class, a proportion of students in each class completed the questionnaires.

2-3. Measuring tools

The questionnaires were distributed among the students at 9:00 AM and 14:00 PM. The questionnaires were checked for being completely filled out, and they were returned to be completed in case there were incomplete items. All students (100%) were willing to take part in the study and filled out the questionnaires completely in spring and fall 2017. It should be noted that the questionnaire took 15-18 minutes to complete. Data were collected by a three-part questionnaire. The first section included baseline characteristics (such as gender, parents' education and job, family income, frequency of referral to dentist and suffering from oral diseases), the second section comprised Trans-Theoretical Model constructs and the third section consisted of fear of dental care. The validity and reliability of the questionnaire had been previously assessed and documented by Iranian researchers (22). The self-efficacy construct included 10 items with four-point Likert scale and reliability of 85%, validity of 0.81 and cut-off point of 20, perceived barriers construct included 10 items with five-point Likert scale and reliability of 81%, validity of 0.83% and cut-off point of 25 and perceived benefits construct consisted of 10 items with five-point Likert scale and reliability of 85%, validity of 0.84 and cut-off point of 20 (22, 25). Self-reported dental cleaning behavior, the target outcome of this study, was derived from the stages of dental cleaning behavior change questionnaire which is based on the Trans-Theoretical Model of behavior change. The reliability of the questionnaire among the Iranian population has previously been ascertained (26).

The stages of dental cleaning behavior comprise five stages, i.e. pre-contemplation, contemplation, preparation, action and maintenance. Pre-contemplation stage, contemplation and preparation stages indicate a lack of dental cleaning behavior while action and maintenance stages indicate that dental cleaning behavior has been adopted. From these five stages we derived a subject-specific binary outcome for self-reported dental cleaning behavior (no/yes), indicating whether students had or had not adopted dental cleaning behavior, i.e. whether they were in the first three stages (pre-contemplation, contemplation, preparation) or in the action and maintenance stages. Fear of dental care included 7 items with four-point Likert scale and validity of 0.8, reliability of 0.85 and cut-off point of 14 (10).

2-4. Ethical consideration

After taking permission from the deputy of research of Kurdistan University of Medical Sciences and Education Department of Sanandaj as well as informed written consent from the

authorities and students, data collection was started. This work was supported by the Vice Chancellor for Research and Technology, Kurdistan University of Medical Sciences, Sanandaj, Iran under ethical code MUK.REC.1394.9.

2-5. Inclusion and exclusion criteria

The inclusion criteria consisted of studying in the first three levels and second three levels of high school, living in Sanandaj and age range of 12-18 years. The exclusion criterion was unwillingness to participate in the study.

2-6. Data Analyses

The collected data were input into SPSS version 22.0 (IBM), and analyzed using independent t-test, Pearson correlation coefficient, ANOVA and Chi-square after determining the normality. Statistical significance was established at $p < 0.05$. We reported estimated logits and Odds Ratios (OR) with corresponding 95% confidence intervals (95% CI).

3- RESULTS

A total of 1344 male and female students with a mean age of 15.22 ± 2.64 years were included in the study. From the perspective of students, dental caries (88.4%) was the most frequent illness and tongue inflammation (0.6%) was the least frequent disease. Parental education, maternal job and family income were significantly correlated with stages of dental cleaning behavior (p=0.0-0.03). Students whose parents had low education and income and whose mothers were housekeeper were located in the initial stages of dental cleaning behavior (p=0.04). Also, 50.2% of the students referred to a dentist once a year and 5.5% referred to a dentist every three months. Fear of dental care was significantly correlated with frequency of referral to dentist (p=0.02). Students with higher level of fear had less referral to dentist. Further, 32.9% of students did not make use of any devices to clean their teeth. Moreover, 42.9% of students were in the maintenance stage of dental cleaning behavior.

Table.1 shows the frequency of students in each stage of dental cleaning behavior. **Table.2** presents the mean and standard deviation of Trans-Theoretical Model constructs and fear of dental care. The mean scores of self-efficacy (p<0.001) and perceived benefits (p<0.001) were increased in the final stages of dental cleaning behavior. The mean scores of perceived barriers (p<0.001) and fear of dental care (p=0.04) were increased in the initial stages of dental cleaning behavior.

Table-1: Frequency and percentage of stages of dental cleaning behavior among high school students

Stages of behavior change	Frequency	Percentage
Pre-contemplation	120	8.8
Contemplation	38	2.8
Preparation	287	21.3
Action	306	24.2
Maintenance	583	42.9
Total	1344	100

Table-2: Mean and standard deviation of trans-theoretical model constructs and fear of dental care by behavior change stages among high school students

Behavior change stages	Perceived benefits		Perceived barriers		Perceived self-efficacy		Fear of dental care	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pre-contemplation	20.60	7.04	23.37	5.77	22.83	8.48	12.35	5.39
Contemplation	21.95	5.88	23.21	6.07	23.84	7.30	12.36	5.55
Preparation	23.14	4.51	22.33	4.61	25.28	7.03	11.49	4.62
Action	24.56	4.94	21.35	4.51	27.18	6.58	11	5.03
Maintenance	25.17	4.75	20.97	4.72	28.95	6.46	10.83	4.82
P-value	0.001		0.001		0.001		0.001	

One-Way ANOVA test: $P < 0.01$ = significant; SD: Standard deviation.

Table.3 illustrates the correlation between determinants of dental cleaning behavior based on Trans-Theoretical Model and fear of dental care. Self-efficacy and perceived benefits were significantly correlated ($p < 0.01$, $r = 0.471$). Moreover, there was a significant inverse correlation between self-efficacy and perceived barriers ($p < 0.01$, $r = -0.314$) and fear of dental care ($p < 0.01$, $r = -0.112$). **Table.4** presents the predictors of dental cleaning behavior among students. In the first model, perceived barriers, perceived self-efficacy and fear of dental care had a significant impact on dental cleaning behavior. In the second model, the perceived benefits variable was eliminated. The findings showed that perceived self-efficacy and fear of dental care had a significant effect on dental cleaning behavior. In the final model, the results of logistic regression analysis indicated that fear of dental care and self-efficacy were the predictors of dental cleaning behavior and remained in the model. The odds of dental cleaning behavior increased with self-efficacy (OR=1.34, 95% CI=1.22-1.48, $p < 0.05$), and decreased with fear of dental care (OR=0.90, 95% CI=0.80-0.98, $p < 0.01$).

Table-3: Matrix of correlation between dental cleaning behavior determinants based on Trans-Theoretical Model, social support and fear of dental care among high school students

Variables	Perceived self-efficacy	Perceived barriers	Perceived benefits	Fear of dental care
Perceived self-efficacy	1			
Perceived barriers	-0.314**	1		
Perceived benefits	0.471**	-0.159**	1	
Fear of dental care	-0.112**	0.247**	-0.112**	1

Pearson Coefficient Test: **$p < 0.01$ (Two-tailed).

Table-4: Results of logistic regression analysis on dental cleaning behavior among high school students (n=1344)

Predictors	b	S.E	OR	95% CI	Wald	P-value
Model 1						
Perceived benefit	0.08	0.11	0.86	0.98 – 1.27	0.68	> 0.05
Perceived barrier	- 0.06	0.02	0.82	0.88 – 0.99	4.43	< 0.05
Perceived self-efficacy	0.07	0.03	1.34	1.22 – 1.48	9.77	< 0.01
Fear of dental care	-0.63	0.27	0.53	0.31-0.90	5.46	< 0.05
Model 2						
Perceived self-efficacy	0.07	0.02	1.21	1.12 – 1.38	9.27	< 0.01
Perceived barrier	-0.04	0.01	0.92	0.97 – 1.02	0.10	> 0.05
Fear of dental care	- 0.61	0.28	0.84	0.80 – 0.98	4.92	< 0.05
Model 3						
Perceived self-efficacy	0.06	0.03	1.34	1.22-1.48	9.14	< 0.05
Fear of dental care	-0.51	0.24	0.88	0.80-0.98	4.32	< 0.01

Variable Dependent: dental cleaning behavior; 95% CI: 95% confidence interval; SE: standard error; OR: odds ratio. Logistic Regression Test: Model (likelihood ratio) chi-square = 13.41, d.f = 1, $p < 0.01$. Nagelkerke R2 statistic = 19.5%. Percentage correctly classified = 52%.

4- DISCUSSION

This study was aimed to determine the impact of Trans-Theoretical Model constructs and fear of dental care on Iranian students' dental cleaning behavior. The findings showed that 42.9% of students were in the maintenance stage of dental cleaning behavior and 32.9% were in pre-contemplation, contemplation and preparation stages of dental cleaning behavior and did not make use of any tools to clean their teeth. In the study of Morowatisharifabad et al., 49.6% of students were in pre-contemplation stage and more than half of them did not use dental cleaning devices (22). The study of Tillis et al. indicated that 60% of patients referring to clinics (20) were in the maintenance stage of dental cleaning behavior. Students' ineffective knowledge of the significance of dental cleaning instruments and their application, their disregard for oral health, especially during childhood, motivation, low commitment and self-efficacy in performing the behavior, lack of oral illnesses experience and ineffective understanding of the severity of these diseases, good evaluation of their oral health, feeling of not being affected by oral diseases, instability to eliminate barriers preventing the behavior and ineffective understanding of the benefits of behavior can be the reasons for not using the dental cleaning tools and placement of students in the first three stages of behavior change. The findings of current study showed that perceived self-efficacy and perceived benefits had a significantly direct correlation with each other and had a significant inverse correlation with perceived barriers and fear of dental care. Fear of dental care was significantly correlated with perceived barriers. Studies have documented the direct correlation of self-efficacy with perceived benefits of oral health behaviors and its inverse correlation with perceived barriers, which is in agreement with the theoretical principles of Trans-Theoretical Model. In this model, people with high self-efficacy have a better understanding of the benefits of performing the dental cleaning behavior (27, 28). Also, according to the principles of socio cognitive theory of Bandura, it was not unexpected that fear and self-efficacy would have a significant inverse correlation with one another. Based on this

theory, people with low self-efficacy experience more fear in confrontation with a situation in which they have to meet valuable standards (29). The results of this study demonstrated that fear, perceived barriers, benefits, and self-efficacy had a significant effect on different stages of dental cleaning behavior change. The experimental results of Tavakil and Fallahi (30), and Kamalikhah et al. (27) support the principle that effects of perceived self-efficacy and benefits are higher for people who are in the last stages of dental cleaning behavior as compared to those in the initial stages. It can be argued that there is a direct correlation between performing the behavior, perceived benefits and increased self-efficacy and reduced barriers. Studies showed that self-efficacy is a significant factor in doing the oral health behavior and is a predictor of oral health self-care (31, 32).

Higher scores of self-efficacy are required to motivate the people and students to make progress during the stages of behavior change (19). It is noteworthy that doing the health behaviors regularly encourages an individual to perform other related behaviors, increases the motivation for and benefits of performing the behavior, overcomes the barriers and fear of doing the behavior and reinforces the individual's self-efficacy again. In line with our findings, a study by Akbay Oba et al. showed that fear of dental care was a risk factor for the incidence of dental caries (14). The results of the present study indicated a significant difference for fear of dental care during the stages of dental cleaning behavior, and it was one of the predictors of performing the behavior. The people who have followed health behavior experience more fear than those who perform the behavior. The researchers in this study expected the fear scores to be higher because one third of the students did not use dental cleaning tools. However, the findings showed the mean score of fear

was below average, which could be related to a lack of conceptual understanding of fear of dental care among the students, or may be attributed to the low number of questions. Negative expression of fear in the culture of the students in the current research, embarrassment of expressing fear in the presence of classmates, self-report nature of questionnaire and similar health behavior in the people suffering from fear and the healthy individuals may be other reasons for the low score of fear during the stages of behavior change.

4-1. Limitations of the study

The results of our study must be considered in light of its limitations. Due to its cross-sectional design, the participants were not followed over time, and the questionnaires were completed via self-report method.

5- CONCLUSION

The findings showed dental cleaning behavior among students was at a low level and various factors such as perceived self-efficacy, benefits and barriers and fear of dental care influenced its performance. Low level of dental cleaning behavior among students is indicative of the necessity to implement interventional studies aiming to promote dental cleaning behavior and to draw attention to the factors involved in it. Interventional studies to identify the concept of fear of dental care, to reduce it and to increase dental cleaning behavior, research on students from various academic levels at different places, and explaining the components of fear of dental care from a qualitative standpoint among various population groups are recommended to be taken into account in future studies.

6- CONFLICT OF INTEREST: None.

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