Stages of change for Tooth decay preventive behaviors and related factors among sample of elementary school students

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Abstract

Background: Oral and dental diseases have detrimental effects in childhood and old age alike and account for 5 to 10 percent of all health costs. As Stages of Change Model shows the present state of an individual's behavior and intention to change behavior, this study tried to determine Stages of Change of tooth decay preventive behaviors and its association with knowledge and attitudes of elementary school students in Nehbandan city.

Methods: This descriptive-analytical study was performed on 414 fifth and sixth grade students of Nehbandan city. From among 13 primary schools (8 girl schools and 5 boy schools), 32 students of the fifth and sixth grades were recruited using randomized cluster sampling method. The data were collected through a pre-made valid and reliable questionnaire covering demographic characteristics, knowledge, attitude, and Stages of Change of the behavior. The collected data were analyzed in SPSS-18 using descriptive and inferential statistical tests.

Results: The mean age of participants was 11.48±0.79 years. The results of the study concerning the Stages of Change of tooth decay preventive showed that in terms of applying dental floss, the brushing teeth, using mouthwash , regular visit to the dentist, and reducing consumption of sugary foods, the most students were at the stages of readiness (34.1%), action (27.8%), pre-contemplation (30.4%), maintenance (26.9%), and contemplation (30.4%) respectively. The mean score of the students' knowledge about preventive behaviors against tooth decay was 6.14±2.1 out of 11, and the mean score of the students' attitude towards tooth decay preventive behaviors was 24.48±6.4 out of 60. Based on the Kruskal-Wallis test, there was a significant difference in the mean knowledge scores based on the stages of change of using dental floss (P<0.001), brushing teeth (P=0.004), using mouthwash (P<0.002), and reducing sugary food consumption (p=0.005). Based on the Kruskal-Wallis test, there was a significant difference in the mean Attitude scores based on the stages of change of using dental floss (P<0.001), brushing teeth (P<0.001), using mouth wash (P=0.003), in terms of regular visit to the dentist (P=0/001) and reducing sugary food consumption (p<0.001). The mean value for each of the behaviors was the highest in the stages of contemplation, pre contemplation, pre contemplation,action, , per contemplation .

Conclusions: The findings of the study showed that the majority of the students were in the non-active stage of behaviors and probably, in the future, they will be susceptible to more dental decay. Trans-theoretical model can be used to determine the strategies related to each of the stages of change of oral and dental self-care behaviors in order to improve and maintain the behavior in interventions and educational programs.

Keywords: Dental Decay Preventive Behaviors; Stages of Change; Students

1. Introduction

Dental decay is the most common chronic disease in childhood where the World Health Organization (WHO, 2013) has announced dental decay as a global problem with 60-90% prevalence among school-aged children. The prevalence of dental decay in the age group of 6-12 years is considered as one of the most important health problems (**1**). Given the high prevalence of dental decay among six to 12-year-olds (school-age) and the sensitivity of their age in terms of the development of permanent teeth and formation of life style and habits, this age group stands as the top priority group in dental and oral health program (**2**). Based on the statistical information related to European countries, 61% of children in the age group of 6-12 years have at least one decayed tooth or a lost tooth (DMFT=1), and the rate of this index, according to the WHO, is 2.4 in the world and for the 12-year-old children in the United States, it is 2.8, in Europe 2.6, Africa 1.3, and in the Eastern Mediterranean region where Iran is placed, it is 2. WHO intends to reduce the rate of dmft to less than 1 by 215 among the children of the Eastern Mediterranean region, nonetheless, the prevalence of dental decay among Iranian 12-year-old students is greater than the universal standards of the WHO (**1-8**). Studies have shown that the pathogenesis of dental caries in children is complex and multifaceted. The causes include genetic factors, bio-environmental factors, and factors related to the lifestyle (e.g., oral and dental health literacy)(**9**).

Recent studies in the United States have shown that teaching preventive behaviors such as using toothbrush dental floss and dentist's check-ups in the American society during the recent decades has increased the percentage of the people that could retain their natural teeth for a later age (**10**). Several studies in Iran have shown that the rate of dental floss and toothbrush use is low amongst students (**11, 12**). For example, a study by Pakpur et al in 2010 on students of Qazvin City showed that only 18% of the students brushed twice daily (**4**) as also confirmed by Farsi, Mohammad- Nejad, etal (**13**). To insist only on oral hygiene does not have beneficial results and turning the knowledge into action and conscious thinking requires a change in attitude (**14**). So, behavior is a process that is created over time and through the sequence of different stages; using the Stages of Change Model can be effective for the promotion of dental and oral health self-care behavior (**6**).

Among practical models in health education and promotion is the trans-theoretical model (TTM), which was introduced in the 1970s by James Prochaska. Among the fundamental structures of the model is the Stages of Change (SOC)(**15**). The individual passes through the following 5 stages before adopting any health behavior: The first stage is pre-contemplation stage and occurs when a person is not thinking of changing in the predictable future, and it usually includes the next coming 6 months. In this stage, people are divided into two categories. The first category involves ignorant people or people with low knowledge who are not aware of the consequences of their behaviors; the second category consists of those who have experienced the change, but because of the previous failures, are not in search for change. This category is usually unmotivated to change and is resistant to it. The second phase is called the contemplation stage, which occurs when a person is thinking of the change in the predictable future but not in an immediate way. It usually lasts between 1 to 6 months. The third stage is the preparation stage and occurs when a person is planning to change in the near future, and it usually takes one month. The fourth step is the action stage in which the person has attempted to change significantly in the past 6 months. Behaviors are the very actions of the individual, and at this stage, new actions can clearly be seen. The individual takes conscious efforts to apply these new actions. The fifth stage is the maintenance stage in which the person tries to keep to the behavior for a period of time, and it usually takes 6 months or more (**15**).

According to the SOC model, which considers behavior change as a process for changing an individual's behaviors towards healthy ones, it requires interventions appropriate to the peoples' stage of preparation and helping them to pass through different stages. Given the fact that this model has little been used in Iran in the implementation of preventive behaviors against tooth decay and as knowledge of the stages of behavior change and its associated factors in designing educational interventions can be effective, this study was designed and performed with the aim to determine the stages of change of tooth decay preventive behaviors and its relation to the knowledge and attitudes of the elementary school students of Nehbandan city in the school year of 2016-2017.

2. Methods

This study was a descriptive-analytical study performed in the academic year of 2016-2017 on the elementary school students of Nehbandan city. The research population was all the elementary school students of Nehbandan city in the academic year of 2016-2017. The sample was estimated to be 304 people on the basis of the proportion comparison formula and on the basis of the results of the study by Morovati Sharif-abad et al (**16**), with p=0.24 and a=0.05 , d=0.048, q=0.76, which given the possible attrition of the sample, a number of 414 people were selected by randomized multistage cluster sampling method from all elementary schools (8 girls' schools and 5 boys' schools) in Nehbandan city, and in each of the schools, a number of 32 students from the fifth and sixth grades were selected in a systematic random way and based on the attendance list (a total number of 414 students were incorporated in the study).

This research was carried out after obtaining the necessary permits from the Research Council of the University and the consent of education officials and the parents of students and the introduction letter from health and treatment network of Nehbandan city. Questionnaires were distributed among the selected students in the classroom and were collected after completion.

A researcher-made questionnaire was used to collect data. This questionnaire consists of 4 parts. The first part consists of 12 questions about demographic characteristics (parental occupation, parental education, family income, living conditions, the number of family members, etc.). The second part of the questionnaire contains items on knowledge construct (11 items) in the form of four-choice options (A, B, C, D) with score1 assigned to a correct answer in each item and zero score assigned to each wrong answer, with the total possible score ranging from 0 to 11 in this scale.

The items of the attitude construct were about preventive behaviors of dental decay and oral health (12 items), with 5 points ranging from 1 "strongly disagree" to 5 "strongly agree" with the total possible score between 12 and 60. The third part of the questionnaire included five items on the status of change of preventive behaviors against tooth decay assessed separately for each of the behaviors of flossing, brushing, mouthwash, frequency of sugary food consumption and regular visit to the dentist. The stages of change were assessed in the format of the following options in the form of Yes and No for each of the preventive behaviors:

a. At the present time, I do not use………….. and do not intend to start it within the next six months.
b. At the present time, I do not use………….. but I intend to start it within the next six months.
c. At the present time, I do not use………….. but I intend to start it within the next month.
d. At the present time, I regularly use………….. and it is less than 6 months I have started it.
e. At the present time, I regularly use………….. and it is more than 6 months I have started it.

With this scale, the individual's intention to do or not to do the behavior is determined by the selection of one stage of the 5 stages of change.

The fourth part of the questionnaire (12 items) is related to the situation of preventive behaviors of tooth decay and the determination of DMFT of the students, which includes items as to the determination of the DMFT index of the students, the frequency of daily brushing, flossing (at least once a day), use of sugary foods per day, using mouthwash once a week, going to the dentist regularly (every six months), the consumption of milk and dairy products (daily), consumption of sticky substances such as snacks, etc. throughout the day and so on.

The validity of the questionnaire was determined through face and content validity in such a way that, first, the initial version of the questionnaire was given to 10 specialists in the field of health education, epidemiology and dentistry and after applying the specialists' opinions, the final version of the questionnaire was prepared. In order to determine reliability, the T-test method was used for the questionnaire in such a way that the questionnaire was completed twice, with an interval of one week, by 10 students who matched the study sample but did not take part in the study. The correlation score was assessed in two stages and the correlation coefficient between the average scores of the various constructs before and after the intervention was obtained to be 0.7 (knowledge construct 0.71, attitude construct 0.78 and the construct of change stages 0.8). The paired T-test showed no significant difference in the mean scores of different constructs in the two stages.

The data collected were analyzed in SPSS, version 18, using chi-square test. As for the comparison of the mean score of knowledge and attitude on the basis stages of

change, since the scores of knowledge and attitude did not have a normal distribution based on Kolmogorov-Smirnov test, it was analyzed by Kruskal-Wallis test at the significance level of α=0.05.

3. Results

In this study, 414 students of fifth and sixth grade from the elementary schools of Nehbandan city were studied. A number of 176 students (42.5 percent) of the studied students were male and the rest were female. The average age of the studied students was 11.48±0.79 years of age.

Concerning the education level of the students' parents, the highest frequency was less than diplomas. And concerning the jobs of the fathers, the highest frequency was free job (self-employed) (46.9 percent) and as for the mothers, they were mainly housewives (84.3 percent) (Table 1). The results of the study concerning the stages of change in the preventive behaviors of tooth decay showed that in terms of the behavior of flossing, most students were at the stage of readiness (34.1 percent), in terms of the

behavior of brushing most students were in action stage (27.8 percent) , in terms of the behavior of using mouthwash most students were in pre-contemplation stage (30.4 percent), in terms of the behavior of regular visit to the dentist most students were in the maintenance stage (26.9 percent) and in terms of reducing sugary foods most students were in contemplation stage (30.4 percent), respectively (Table 2).

The average score of the student's knowledge about preventive behaviors of tooth decay was 6.14± 2.1 and the average score of the students' attitude about preventive behaviors of tooth decay was 24.48±6.4. Based on Kruskal-Wallis test, there was a significant difference between the average score of awareness based on the stages of change in the behavior of using the dental floss, the behavior of brushing, the behavior of mouthwash, and the behavior of reducing the consumption of sugary foods. The average value for each of the behaviors was the highest in the stages of action, action, thinking and maintenance, respectively.

Table 1: Frequency distribution of demographic characteristics of the participants		
Variable	Frequency	Percentage
Father's occupation:		
Employee	98	23.7
Worker	79	19.1
self-employed	194	46.9
Others	43	10.4
Mother's occupation:		
Employee	34	8.2
Private sector	21	5.1
Housewife	349	84.3
Others	10	2.4
Father's education:		
Below diploma	237	57.24
High school diploma	118	28.5
Associate or above	59	14.3
Mother's education:		
Below diploma	252	60.87
High school diploma	124	30
Associate or above	38	9.3
Total	414	100

Table 2: Frequency distribution of preventive behaviors against dental caries in terms of behavior stages of change

Behavior	Precontemplation N (%)	Contemplation N (%)	Readiness N (%)	Action N (%)	Maintenance N (%)
Dental floss use	111 (26.8)	38 (9.2)	141 (34.1)	121 (29.3)	69 (16.7)
Toothbrush use	85 (20.5)	42 (10.1)	106 (25.7)	115 (27.8)	37 (9)
Mouthwash use	126 (30.4)	100 (24.2)	107 (25.9)	102 (24.7)	83 (20.1)
Regular visit to the dentist	48 (11.6)	108 (26.1)	18 (4.4)	28 (26.8)	111 (26.9)
Reduced consumption of sugar	44 (10.6)	126 (30.4)	41 (9.9)	47 (11.4)	113 (27.4)

Table 3: Comparison of knowledge score means in terms of change in preventive behaviors against dental caries

Change stage	Dental floss use M±SD	Tooth brush use M±SD	Mouthwash use M±SD	Regular visit to the dentist M±SD	Reduced consumption of sugar M±SD
Precontemplation	5.91±2.1	5.7±2.2	6.1±2	6.2±1.9	5.4±2.4
Contemplation	5.6±2.3	5.2±2.7	5.9±2.9	6.1±2.1	5.6±2.4
Preparation	6.8±1.7	6.1±2	6.7±1.9	6.2±2.1	6.3±1.9
Action	6.2±2	6.5±2.1	6.7±2	6.5±2	6.4±2
Maintenance	5.8±2.1	6.3±1.7	5.3±1.9	5.7±1.9	6.4±1.7
P	< 0.001	0.004	<0.002	0.58	0.005
Post-hoc test	1 & 3 (P<0.001)	2 & 4 (P=0.004)	2 & 3 (P=0.04)	-	4 & 1 (P=0.02)
	2 & 3 (P<0.001)	2 & 5 (P=0.02)	3 & 5 (P=0.003)		5 & 1 (P=0.02)
	3 & 5 (P=0.003)				

Table 4: Comparison of attitude score means in terms of change in preventive behaviors against dental caries

Change stage	Dental floss use M±SD	Tooth brush use M±SD	Mouthwash use M±SD	Regular visit to the dentist M±SD	Reduced consumption of sugar M±SD
Precontemplation	6.9±26.9	5.6±29.1	6.3±26	6.4±25.6	7.2±28.1
Contemplation	5.9±26.9	6.7±2.64	5.4±25.2	5.5±24.3	5.7±26.7
Preparation	4.9±22.8	5.6±24.9	6±22.7	6.12±23.7	6.4±24.7
Action	7.1±24.4	7.2±24.8	8.6±24.7	8.5±29.1	5.7±24.2
Maintenance	6.9±23.3	5.6±22.8	7.8±25.1	6±23.6	5.9±22.7
P	< 0.001	0.001<	0.003	0.001	0.001<
Post-hoc test	1 & 3 (P<0.001)	1& 3 (P=0.004)	1 & 2 (P=0.001)	2 & 4 (P=0.003)	1& 3 (P=0.007)
	1 & 5 (P<0.009)	1 & 4 (P=0.002)	2 & 3 (P=0.04)	3 & 4 (P<0.001)	1 & 4 (P<0.001)
	2 & 3 (P=0.003)	1 & 5 (P<0.001)		4 & 5 (P=0.003)	1 & 5 (P<0.001)
		2 & 5 (P<0.01)			2 & 5 (P=0.006)

Based on the Kruskal-Wallis test, there was a significant difference between the mean score of attitude based on the change stages in the behavior of using dental floss, behavior of tooth brushing, behavior of mouthwash, behavior of regular visit to the dentist and behavior of reducing sugary foods, and the average value in each of the behaviors was the highest in the stage of thinking, maintenance, thinking, thinking and readiness, respectively (table 3 and 4).

4. Discussion

The aim of this study was to determine Stages of Change of tooth decay preventive behaviors and its association with knowledge and attitudes of elementary school students in Nehbandan city. Based on the results of the study in terms of the behavior of using dental floss, the majority of the studied students (60.9%) were in the pre-action stage (the total of the pre-contemplation, contemplation and preparation stages), which means that so far they have not used dental floss. The results of the studies by Teimuri et al, Mazlumi et al, and Ashrafi-zade et al also suggest that the majority of the studied students were in the preoperative stage and did not use dental floss (16-18). In a study by Hariku et al, in the behavior of dental and

oral self-care, only 21% of participants were in the pre-contemplation and contemplation, which is somehow inconsistent with the present study (19). The reason for this situation can be explained as the status of immigration and marginalization of Nehbandan city, which influences the economic, social, and cultural conditions of the residents of this region and indirectly it affects the adoption of healthy behaviors.

Also in terms of the behavior of brushing, the majority of the studied students (56.3%) were in the preoperative stage (the total of pre-contemplation, contemplation and preparation stages), i.e. they did not use a toothbrush. The results of the study by Mohammadi-Zaidi et al also indicate that the majority of the studied students were in preoperative stage and did not brush (20).

As for the behavior of using mouthwash, the majority of the studied students (80.5%) were in preoperative stage, meaning that so far they did not use mouth wash, which is consistent with the results of the studies by Tylys on self-care oral behavior, by Kim Vedomyt on physical activity and Purtarani in terms of the regular use of breakfast.

In terms of the behavior of the consumption of sugary foods, the majority of the studied students (59.9%) were in the preoperative period (the total of pre-contemplation,

contemplation and preparation stages), meaning that they did not have so far the reduced sugary food consumption, which is consistent with the results of the studies by Tylys on oral self-care behavior, by Kim Vedomyt in relation to physical activity and by Purtarani in terms of the regular use of breakfast (**21, 23, 24**). Concerning the behavior of regular visit to the dentist, the majority of the studied students (53.7%) were in action phase. The results of the studies mean that the majority of the students were in action stage and had regular visit to the dentist.

According to the findings of the study, there was a significant difference between the mean score of knowledge in terms of the change stages in the behavior of using dental floss, behavior of brushing, behavior of mouthwash, and behavior of reducing the consumption of sugary foods. The average value for each of the behaviors in the stage of action, contemplation and maintenance was the highest, which has been used more in the final stages of behavior change than the early stages of it. The study by Kim and Prochaska also showed that along with the change stages, the knowledge of the individuals cause them to move along the change stages and consequently the promotion of their self-efficacy. Also, according to the findings of this research, there was a significant difference between the mean score of attitude in terms of the change stages in the behavior of using the dental floss, behavior of brushing, behavior of mouthwash, behavior of regular visit to the dentist and behavior of reducing the consumption of sugary foods, and the average value in each of the behaviors was highest in the stage of contemplation, maintenance, thinking, thinking, and readiness, which in fact indicates that the individuals in the lower levels of behavior change have had a positive attitude towards behavior, which in order to achieve the higher stages, they need factors other than the individual's factors.

However, this study indicates that a high percentage of the elementary students in Nehbandan city are in non-active stages of self-care behaviors of oral and dental health, which is a threat concerning the increase of the chances of tooth decay and inflammation of the gums and is a warning to health authorities so as to keep paying attention to promotion and continuance of preventive and treatment activities in oral and dental health. According to the concepts of trans-theoretical model, it is recommended that the first process of change, i.e., awareness raising, be used to move the individuals from the stages of contemplation and pre- contemplation to closer stages to behavior, and by using a discussion which is accompanied by feedback, their knowledge be increased about the causes, the result, and the treatment of a special issue.

Limitation of this study include using self-administered questionnaires and self-report limitations in health behaviors, examining the behavior at one point of time, lack of generalization of the results of the study to other age and population groups especially groups from other educational degrees. Therefore, it is suggested that future studies be designed on other groups.

5. Conclusion

The results of this study showed the low performance of preventive behaviors of dental caries among students. Given that the place of data collection was in the elementary schools, which are regarded as one of the most important sources of acquiring health information about oral and dental self-care, it is essential to perform proper educational programs in schools to increase the knowledge and performance of the students.

6. Acknowledgements

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