

ORIGINAL ARTICLE

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Effectiveness of a health improving model on oral health behavior for adolescents by nursing interventions

Fadime Ustuner Top¹, Ayse Ferda Ocakci²

¹Giresun University, Faculty of Health Sciences, Giresun, Turkey

²Koc University, Faculty of Health Sciences, Istanbul, Turkey

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Abstract

Information Processing Theory and Improving Health Model by nursing interventions were applied to adolescents with low oral and dental health behavior. The method of study has an experimental design with pre-test and post-test control groups. According to the results of oral health care form, individuals that are chosen from bottom 25% of the attitude scale were placed in the experimental (n=40) and control (n=40) groups randomly. The data were collected by four different forms of which are personal information form, multi-dimensional oral health control scale (MOHLCS), oral health care form (ODHB) and oral examination form. Increased mean internal focus control point which was a sub-scale of MOHLCS scale was found in the experimental group compared to control group. The mean score of ODHB after the post test and re-test between the groups, a statistically significant difference was determined in favor of the experimental group. Conclusions: The nursing attempts that were applied to Pender's Health Promotion Model and Gagne's Theory of Information Processing were effective for improving the oral health behavior.

Keywords: Adolescents, oral health, health promotion, nursing interventions, theory

Introduction

Oral dental disease is a significant public health problem due to its frequency and effects on individuals and society as well [1]. Oral and dental health issues lead to serious economic and social problems in developing countries such as Turkey [2,3].

It is indicated in target 24 of 21st century decisions of World Health Organization (WHO) that oral and dental health services are needed to become united with basic health services [1]. Efforts for protecting and improving oral and dental health provide a substantial reduction in expenses by ensuring a significant downfall for these diseases [3-5].

Nurses have been accepted as a fundamental human force for health protection and development applications by WHO and many other medical institutions [1]. Child nursing are much closer to children than the dentist in terms of protective measurements at

an early stage, since their work areas cover the life area of kinds such as schools, street, clinic etc. Oral health education helps the individuals to inform about oral diseases and their relationship to overall health [6,7].

Nurses' knowing the factors affecting behavior change will provide an important contribution to health education that is held to foster behavior changes and to acquire positive behaviors related to health. Pender's Health Promotion Model shows the relation between affected factors and the path to be followed for achieving the behavior. According to Pender, it is possible to assess all these factors and affect the changeable ones to gain positive health behaviours. Health Promotion Model, which has the qualities of promoting health, includes factors promoting and preventing health. According to Pender's hypothesis, demographic and biological opponents affect health promoting behaviours indirectly via cognitive and perceptual variations [8,9].

Gagne's Theory of Information Processing guides the organization of learning situations while taking the basic factors into consideration. Considering the processes in human memory, Gagne has put the learning and teaching situations in an order to show how they occur. Pointing that motivation is the prerequisite for learning, he based his Learning model on these principles.

*Corresponding Author: Fadime Ustuner Top, Giresun University, Faculty of Health Sciences, Giresun, Turkey

E-mail: fadikom@hotmail.com

Information Processing Theory claims that learning is mainly affected by sensory, short term and long term memory [10,11].

Nurses can simplify behavioral changes with the help of facilities based on Gagne's Theory of Information Processing with the external factors that affects stimulus control in Health Promotion Model. Health Promotion Model and the Theory of Information Processing-based nursing interventions help adolescents to understand the relationship between conditions of their health and health behaviours, and it props the raising of health promotion behaviour and the internal focus of control by encouraging adolescents to change their negative behaviors.

The aim of this study is to investigate the effect of nursing interventions on a comprehensive oral health behavior of adolescents with low oral health care by applying to Gagne's Information Processing of Theory and Pender's Health Promotion Model.

Material and Methods

Study desings

The model of the study has experimental designs with pre-test and post-test control groups.

Setting and sample

The universe of research consists of 6th class (12 age group) students (N=1456) from twelve primary schools located in the center of Giresun. Twelve-year-old age group adolescents were determined as the study group as the formation process of the permanent teeth occurs at this age [12]. The sampling size of 228 adolescents is determined with 5% of error, the 50% of effect size and 90% of power. Two of the primary schools out of twelve are selected for the study by the most heterogeneous cluster sampling method. One of the selected school was determined as the experimental group (n=128) and the other one was determined as the control group (n=136) randomly. Oral and Dental Health Behaviour Form were given to students and assessments were made, the lowest 25 % attitude points' students were taken into experimental (n=40) and control (n=40) groups.

Independent variable of the study is oral health promoting program; dependent variable is health promoting behavior; internal control focus is oral health and DMFT (decayed, missing, filled and the total teeth) is another value calculated.

Measurements/Instruments

The investigated data were collected by applying Personal Information Form, Multidimensional Oral Health Focus of Control Scale (MOHLCS), Oral and Dental Health Behavior Form (ODHB) and Oral Examination Form. MOHLCS scale, developed by Peker [7], was applied to twelve-year-old students (n=263) of two elementary schools which were not in the sample group. The Cronbach Alpha scale found as 0.80 with the values of sub-groups between 0.78 and 0.80. The oral-dental behavior form consisted of 10 items. The oral-dental examination was done by the same dentist in schools and the forms were filled by the researchers. According to the results of examination, DMFT values of each child were calculated [12].

Data collection/procedure

Nursing interventions were designed according to Pender's Health

Promotion Model and Information Processing Theory, and applied to experiment group in order to develop a comprehensive oral health behavior. According to the implepmentation guide to promote oral health behaviour; a total of 16 activities were done (8 weeks; 2 activities per week). Content validity of the prepared program was ensured via 12 faculties' who are in the field of child health, oral health, public health and educational sciences opinions. The duration of each activity was determined as 40 minutes. Control group's oral health was checked without intervening. The data were collected three times as; pre-intervention, post- intervention (3rd month) and re-test (6th month). Oral health examination was done twice: first follow up and second follow up (6th month) with the dentist. Statistical analyses were performed with SigmaStat for Windows 22 (SPSS 2014). In evaluation process, the descriptive analysis, validation analysis (Cronbach's alpha), t-test, correlation and covariance analysis methods were used.

Ethical consideration

Directorate of National Education in Giresun (Nr: 359) and Ethics Boards (Nr: 8011) permissions and the participants' consent were taken for the study. The permission was taken from Peker about the use of MOHLCS scale in the study [7]. For ethic concerns, at the end of data collection session from experiment group, the same program was applied to the control group to create equality.

Results

Gender ratio of the experiment group children was 68.8% male (n=55) and 31.2% female (n=25). It was determined that experimental and control group children had similar features demographically.

There was no significant difference between the perception of overall health and oral dental health of children in the pre-test of the experimental and control groups ($p > .05$). It was confirmed that there was a statistically significant difference between the overall health and oral dental health in the second test which was performed 6 months later ($p < .05$). While 30% of the children in the experiment group stated their oral health perceptions as "good" during the pre-training (n=12), this ratio increased to 50% (n=22) after training. It was also concluded that there was a statistically significant difference between the first and second test scores ($p < .05$).

Table 1 represents the comparison of group characteristics and the measurement time of mean scores of MOHLCS scale with their sub-dimensions. A difference was found between the pre-test and post-test scores in the source of difference in internal focus of control scale in the experimental group. Internal focus of control score did not decrease in re-test and it shows no statistically significant difference. It was stated that there was a difference between the pre-test and post-test scores in the lower size of internal focus of control in the control group ($p < .05$).

Table 2 shows the comparison of the mean scores of ODHB according to group characteristics, and time of measurement. It was determined that the pre-test score of oral health care increased significantly during post-test and re-test in the experimental group after training as seen on the table ($1 < 2 < 3$, $p < .05$). A statistically significant difference was detected between the pre-test and post-test scores ($1 < 2$, $p < .05$) whereas there was no statistically

significant difference between post-test and re-test in control group ($p > .05$). The ODHB post-test score of the experimental group increased to 4.40, while that of re-test scores increased to 0.45 in the control group with the statistically significant difference between the two groups ($p < .05$).

The weak level of positive relationship was found between the ODHB score and internal focus of control scale of MOHLCS in the experimental group's post-test ($r = .328$, $p < .05$) and re-test ($r = .366$, $p < .05$) scores.

A statistically significant difference was found between the average of filled permanent tooth and decayed permanent tooth from the assessment of oral examination findings at post-test and the DMFT scores of the groups ($p < .05$). A decrease has seen in decayed teeth ($1 > 2$) number while an increase has seen in filled teeth ($1 < 2$) number when the post-test data evaluated for the experimental group. As the source of difference in control group, it was determined that the value of the number of filled permanent teeth ($1 < 2$) and DMFT scores ($1 < 2$) increased in post-test evaluation (Table 3).

Table 1. The comparison of average score of MOHLCS scale and its sub-dimensions according to group characteristics and the measurement time

MOHLCS scale	Group	Pre- test measurement	Post-test measurement	Re- test measurement	Test values**		Difference
		$\bar{X} \pm SS$	$\bar{X} \pm SS$	$\bar{X} \pm SS$	F	P	
Internal control focus	Experimental	26.08 $\pm$ 3.76	39.18 $\pm$ 2.71	39.20 $\pm$ 2.22	418.3	0.00	1<2,3
	Control	26.18 $\pm$ 2.94	27.08 $\pm$ 2.93	27.15 $\pm$ 2.39	10.37	0.00	1<2,3
	Test values	t=-0.13 p=0.89	t=19.18 p=0.00	t=23.35 p=0.00			
Chance focus	Experimental	13.55 $\pm$ 4.13	8.18 $\pm$ 1.06	7.68 $\pm$ 0.99	81.05	0.000	1>2>3
	Control	13.10 $\pm$ 3.89	12.28 $\pm$ 3.72	13.48 $\pm$ 2.94	0.38	0.021	1,2<3
	Test values	t= 0.50 p=0.620	t=-6.70 p=0.000	t=-11.83 p=0.000			
External Information Focus	Experimental	10.93 $\pm$ 2.65	7.93 $\pm$ 1.62	7.60 $\pm$ 1.46	34.57	0.000	1>2>3
	Control	10.38 $\pm$ 2.66	10.43 $\pm$ 2.35	10.53 $\pm$ 1.75	0.10	0.742	1,2,3
	Test values	t=0.93 p=0.361	t=-5.53 p=0.000	t=-8.10 p=0.000			
External Applications Focus	Experimental	8.40 $\pm$ 2.02	7.50 $\pm$ 1.30	6.98 $\pm$ 0.92	17.82	0.000	1,2>3
	Control	8.65 $\pm$ 2.13	7.98 $\pm$ 1.64	7.95 $\pm$ 1.54	3.57	0.061	1,2,3
	Test values	t=-0.54 p=0.592	t=-1.43 0.15	t=-3.45 p=0.000			
Socialization Focus	Experimental	5.83 $\pm$ 1.62	4.98 $\pm$ 0.97	4.83 $\pm$ 0.90	10.83	0.021	1>2,3
	Control	5.50 $\pm$ 1.66	5.80 $\pm$ 1.56	5.88 $\pm$ 1.22	1.50	0.230	1,2,3
	Test values	t=0.89 p=0.381	t=-2.84 p=0.000	t=-4.37 p=0.000			
Total	Experimental	64.63 $\pm$ 8.23	67.75 $\pm$ 3.49	66.28 $\pm$ 2.94	10.69	0.000	1,2>3
	Control	63.60 $\pm$ 8.68	63.58 $\pm$ 6.92	65.03 $\pm$ 5.27	1.60	0.271	1,2,3
	Test values*	t=0.54 p=0.594	t=3.40 p=0.010	t=1.31 p=0.190			

*Independent samples t test was applied.

** One way analysis of variance was used for correlations

Table 2. The comparison of average scores of ODHB according to group characteristics and measurement time

Group	Pre- test measurement	Post-test measurement	Re- test measurement	Test values**		Difference
	$\bar{X} \pm SS$	$\bar{X} \pm SS$	$\bar{X} \pm SS$	F	P	
Experimental	2.70 $\pm$ 1.04	7.10 $\pm$ 1.19	7.40 $\pm$ 1.26	418.21	0.000	1<2<3
Control	2.50 $\pm$ 1.01	2.95 $\pm$ 1.11	3.00 $\pm$ 1.16	8.13	0.000	1<2,3
Test values	t=0.87 p=0.390	t=16.11 p=0.000	t=16.30 p=0.000			

*Independent samples t test was applied.

** One way analysis of variance was used for correlations.

Table 3. The comparison of average scores of DMFT according to group characteristics and measurement time

DMFT Form	Group	1. examination (Before education)	2. examination (6 mounths after)	Test values**		
		$\bar{X} \pm SS$	$\bar{X} \pm SS$	t	p	Difference
Decayed milk teeth	Experimental	0.20±0.46 (0-2)	0.05±0.22 (0-1)	2.22	0.032	1>2
	Control	0.13±0.40 (0-2)	0.10±0.30 (0-1)	1.00	0.320	1,2
	Test values	t= 0.77 p= 0.440	t=-0.84 p=0.401			
Decayed permanent Teeth	Experimental	3.15±1.46 (0-7)	1.85±1.05 (0-4)	5.40	0.000	1>2
	Control	3.25±1.17 (1-6)	3.23±1.10 (1-6)	0.19	0.851	1,2
	Test values	t= -0.34 p= 0.740	t=-5.72 p=0.000			
Filled permanent Teeth	Experimental	0.08±0.27 (0-1)	1.33±1.44 (0-5)	-5.68	0.000	1<2
	Control	0.23±0.58 (0-2)	0.48±0.75 (0-2)	-2.68	0.010	1<2
	Test values	t=-1.49 p= 0.142	t=3.31 p=0.000			
Pulled teeth	Experimental	0.65±0.74 (0-2)	0.73±0.75 (0-2)	-0.90	0.371	1,2
	Control	0.45±0.75 (0-3)	0.58±0.78 (0-3)	-1.95	0.060	1,2
	Test values	t=1.21 p= 0.234	t=0.88 p=0.382			
DMFT value	Experimental	3.88±1.62 (1-8)	3.90±1.58 (1-8)	-0.37	0.712	1,2
	Control	3.93±1.46 (1-7)	4.28±1.36 (2-8)	-3.81	0.000	1<2
	Test values*	t=-0.145 p=0.892	t=-1.13 p=0.260			

*Independent samples t test was applied

** Paired-Samples t test was applied

Discussion

The experimental and the control groups were similar in terms of demographic characteristics which makes these characteristics noneffective on internal focus of control scale and ODHB.

The perception of health status is defined as one of the influential variables on health behavior. According to the present study, adolescents perceive the overall health better than oral health. This result might show that the experiment group does not care enough about oral health. It has been highlighted in the studies carried out by Gilbert and Nuttall (1999), Chang et al (2010) that there is a significant difference between individual's oral health evaluation and oral health evaluation by dentist. Supporting our conclusion Köse et al (2010) stated that 38.0% of the individuals attach importance to their overall health and 48.0% of the individuals attach importance their oral health. Onal et al (2009) worked on 12-year-old children, in order to determine the perception of oral health care and found similar conclusion with ours. When perception of oral health care in the experimental group compared with the time of the measurement, the difference is statistically significant in the experimental group ($p < .05$), while it does not differ significantly in the control group. There has been no assessment on health perception in similar previous studies [15,16]. As a result of our study, a comprehensive oral health education to develop adolescents' oral health care may be

considered to increase the sensitivity of not only overall health perception but also oral health care perception.

In order to improve the health, the individual has his own life style within his own value system that is shaped according to his own expectations. In the adoption and sustainability of behaviors for improving oral health, individuals' perceptions of control of oral health gain importance [7].

The average scores of internal focus of control in the control group pre-test and post-test show a statistically significant difference. Increase in post-test scores is very low. Developmental features and adoption of the individuals to the scale are taught to be effective for this increase. Internal control focus points of the experimental group increased more significantly than that of the control group. Croghan et al (2004) studied on school nurses in England ($n=38$) and have identified that the nurses have the role of ensuring the children the responsibility of health. Chabot et al (2010) has determined that 73% of healthcare workers ($n=251$) have accepted their role in improving health. In our study activities, messages have been given to individuals that they may change their focus of control towards internal focus of control. The effect of the study is taught to be still effective by checking stable test scores in re-test. Nursing applications toward to develop a comprehensive oral health behavior have supported the adolescents to understand the relationship between health status and health behaviors. Moreover,

support the adolescents to increase their focus of internal control by changing their behaviors modification and encouraging them as well.

Similar results have been reported by Broup and Holstein (2004), who determined that school health nursing interventions in Switzerland support decision-making process of children about health development at 11-13-15 age groups (n: 5205) and also increase students' autonomy. Similarly, Tabak and Akköse (2006) determined that adolescent's perceptions of internal health focus of control increase by the training of health focus of control. Buglar et al (2010), worked on 92 people (41 males, 51 females) and stated that the behavior of self-sufficiency affects the oral health care (tooth brushing, flossing) significantly. Alici and Sarıkaya (2009), also point out that internal factor are rather effective to determine the behaviour. Individuals' taking responsibility of their own is required to develop the behavior.

ODHB score increased significantly in favor of the experimental group. Nursing interventions have contributed to increase sensitivity to develop the behavior of adolescents' oral health care. The increase in scores has continued in re-test since some applications such as tooth brushing process, making plans for behavior, homework, etc. are practiced to make the behavior more effective. The increase in experimental group's ODHB scores shows the efficiency of nursing interventions, designed to develop the oral health behavior.

Friel et al (2004) showed health training program to be effective for acquiring the habit of tooth brushing similar to our study. Vanobbergen et al (2004) evaluated the effect of a 6-year oral health education programme in primary schoolchildren in Belgium (n=3291), put forth that there has been significantly increase in food selections ($p<0.01$) and topical fluoride usage ($p<0.05$) in the experiment group whereas there has been no difference in the frequency of tooth brushing both in experimental and control group. Ercan et al (2008) stated that the combination of fissure and caries-fluorine might be superior in terms of prevention of new decays and also added that only the oral hygiene education is not sufficient for a comprehensive oral health.

Increasing the internal control of adolescents promote the health behavior of them according to our results. Similarly Peker indicated that individuals with a high internal focus of control carry out more comprehensive oral health behaviors [7]. Elder et al concluded that there is a negative correlation between the preventive health behavior and external control [25]. The internal focus control is determined to be important health behavior and fairly important in terms of protection the behavior which is changed and improved in numerous studies [2,15,26,27,28].

DMFT values of the children are determined by examining their oral dental health before and 6 months after the applications and found as 3.88 and 3.90, respectively in the experimental group of our study. Taşveren et al (2005), Şahin et al (2009), determined the average score of DMFT of 12 years old children between 3.33 and 4.33. Namal and Can reported the average value of the DMFT of 13-14 age group as 3.23 - 4.07 for the Turkey [28]. On the contrary, Gökalp et al (2007) found DMFT of 12 years of age group value as 1.9. The higher DMFT scores in our study might be related with the fact that adolescents with a low comprehensive oral health

behavior included. Pardi et al (2010) worked with 12 years of age group children and found the DMF value as 1.87. The 21st century objective of WHO for the DMFT value of a comprehensive oral health of 12 years old children is determined as 1.5 [1]. DMFT values of the present study are behind this WHO's target value. Inadequate or incorrect oral dental health behavior's thought to be effective in the high DMFT values of our study.

The development of a comprehensive oral health behavior in the experiment group has prevented the formation of dental decayes. Supporting our results, Peker and Bermek (2011) indicated that higher the internal focus of control, less dental decayes. Köse et al (2010) also stated that oral hygiene education reduces the rate of plaque index set.

Conclusions

A nursing model, based on Pender's Health Promotion Model and Gagne's Information Processing Theory, was created to develop oral health care behavior in the present study.

After the intervention, perception of internal focus of control (39.20 ± 2.22) and oral health behavior points (7.40 ± 1.26) of experimental group has outnumbered the value calculated for control group ($p<.05$). When the results compared; the ODHB score has risen 4.40 points after the training in the experiment group, and 0.45 points for control group; and the difference between was found meaningful. When the experiment group was checked second time it was seen that permanent teeth caries decreased, tooth-filled increased and the average DMFT in control group increased. This nursing model, established to promote oral health behavior, is an applicable guide for the adolescents to improve their internal focus of control and oral health behavior.

Pediatric nurses have a crucial role for acquiring the children necessary health promotion behavior since they have the advantage of meeting with them at any time. Therefore, it is recommended that the original education programmes and practices should be prepared in order to increase the nurses' perceptions of the internal control focus on the achievements and facilities which develop oral health care behavior.

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Conflict of interest

The authors declare that there is no conflict of interest.

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