



# Effect of Oral Health Education on Adoption of Dental Caries Preventive Behaviors among Elementary Students Using Combined Training

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### Authors

Rashidi Birgani H.<sup>1</sup> PhD,  
Niknami Sh.<sup>\*2</sup> PhD

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<sup>1</sup>Health Education Department, Medical Sciences Faculty, TarbiatModares University, Tehran, Iran

<sup>2</sup>Health Education & Health Promotion Department, Medical Sciences Faculty, Tarbiat Modares University, Tehran, Iran

### \*Correspondence

Address: Health Education & Health Promotion Department, Medical Sciences Faculty, Tarbiat Modares University, Nasr Bridge, Jalal-Al-Ahmad Highway, Tehran, Iran  
Phone: +98 (21) 82880  
Fax: +98 (21) 88006544  
niknamis@modares.ac.ir

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## ABSTRACT

**Aims** Oral health is a necessity and part of general health. Due to the effects of poor oral health and untreated oral diseases on quality of life and prevalence of these diseases at school ages, this study aimed to determine the effect of oral health education using combined training on adopting dental caries preventive behaviors among elementary students.

**Materials & Methods** In this quasi-experimental study, girl students at elementary schools in the town of Kootabdollah during the second semester of the academic year of 2017 were selected by multistage cluster random sampling method and they were divided in two groups of 60 students into intervention and control groups. Data collection tools included demographic and background profile questionnaire and Valid Scientific Researcher Questionnaire to assess knowledge, attitudes and behaviors in the case of dental caries prevention that at three levels: before, immediately after and two months after the intervention by students was completed. The experimental group received two training sessions in a form of combined training. Data were analyzed by SPSS 16 software using appropriate tests.

**Findings** There was no significant difference between experimental and control groups before the intervention ( $p>0.05$ ). But, immediately after and 2 months after the intervention, there was a significant difference between the experimental and control groups in mean scores of knowledge, attitude, and behavioral ( $p<0.05$ ).

**Conclusion** Combined training can increase knowledge, change attitudes, and improve the adoption of dental caries preventive behaviors that affect oral and dental health of students.

**Keywords** Health Education; Dental Caries; Oral Health; Behaviors; Students

## CITATION LINKS

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## Introduction

The World Health Organization (WHO) introduced oral health as an essential part of public health during whole life and has shown that poor oral health and untreated oral diseases can have a profound impact on quality of life. Non-compliance with oral health-related behaviors influences eating, talking, sound quality, and speech influence and due to their impact on the beauty of the person, they can make the person withdraw from the community and cause pain, discomfort, and absenteeism from school [1-3].

Dental caries is the most common disease among human beings, from which more than 99% of the humans suffer and there are few people, who have never experienced it during their life time [4]. It is also the most prevalent oral disease in several Asian and Latin American countries [5].

To prevent dental caries and periodontal diseases, some behaviors are emphasized, including using dental floss, tooth brushing, mouthwash, and fluoride therapy and regular dental checkups [6-8].

Dental caries is currently the most common chronic disease among children, which is 5 times more common than asthma and 7 times more common than seasonal allergies in children. It has been reported that in the Third World countries, dental caries is the 4<sup>th</sup> expensive diseases in terms of treatment costs [9].

Oral health can affect children's performance at school and their success in future, so that more than 50 million school hours per year are lost due to oral health problems. Accordingly, the children suffering from weak oral health, have daily limited activities 12 times more than those with full oral health. Annually, 5% to 10% of the expenditures on public health in industrialized countries are spent on treating oral diseases that impose a large financial burden on the government [10].

Health actions and behaviors of people in any society are influenced by their knowledge and attitudes [11]. In this regard, in order to reach goals of preventive programs, effort to raise the level of knowledge and awareness and improve their attitudes toward prevention of oral diseases is necessary [12].

Using combined training means combining e-learning with other traditional methods that is a new vision to education. Nowadays, combined training is considered by educational practitioners in order to combine features of new digital media and face to face methods. Some believe that combining new media and powerful educational methods can have the most impact on learning among students. Combined training is in fact the combination of two or more methods, which benefit in-class sessions in addition to other educational

methods [13, 14].

Increasing survival and improving the effectiveness of learning is another benefit of combined learning that has been proven by empirical studies [15]. Other benefits of combined learning include lower costs, improved education, and increased interactions [16-19].

Because of these features, combined learning is growing rapidly both in industry and in education, and most educational institutions and organizations use a combined learning approach to deliver better services to their learners [16]. Studies show that using updated technologies in transferring education enables learners to learn more with higher speed and performance and feel more satisfied with attending a training session [20]. Also, because learning the students' viewpoints on teaching materials is one of the essential points in learning, the combination study was used in this study.

Peyman *et al.*, and Peyman and Samiee Roudi emphasized the effectiveness of educational programs on improving behaviors related to oral health [21, 22]. In a study conducted by Wickremasinghe and Ekanayake in 2016, they concluded that oral health education is effective in understanding, implementing, and oral health status of students [23].

According to the new goals of WHO for oral health in 2020, which has focused on using experiences and evaluation of previous goals and emphasized the importance of oral health as an unavoidable part in general health [24] and also in line with the perspective of prevention priority compared to treatment in general policies of the country [25] as well as the effects of poor oral health and untreated oral diseases on quality of life and prevalence of such diseases in school ages in Iran [26] and given the benefits of using combined training [27], the aim of this study was to determine the effect of oral and dental health education on adoption of dental caries preventive behaviors among students.

## Materials and Methods

The present study is a quasi-experimental study conducted among girl students at elementary schools in Kootabdollah, Khuzestan province, during the second semester of 2017 academic year.

The subjects were selected from elementary schools in Kootabdollah, using multistage cluster sampling method. At first, a list of girl elementary schools in Kootabdollah was prepared. Then, 2 schools were randomly selected. The selected schools were divided into two groups of experimental and control. The 5<sup>th</sup> and 6<sup>th</sup> grades were selected in each school

due to their accessibility. Between these grades at each school, 2 classes were randomly selected and their students were included in the study until reaching the targeted sample size.

The sample sizes were determined according to the Kappa-Pookak formula, taking into account  $p_1=50\%$  and  $p_2=75\%$  [28]. A total of 55 individuals were determined, including about 10% dropping samples; finally, 60 students in the experimental group and 60 students in the control group were selected.

Inclusion criteria included and willingness to participate in the study and exclusion criteria included imperfect completion of questionnaires, lack of willing to continue to participate in the study, and move to other schools.

The data collection contained two parts; firstly, the demographic and background questionnaire assessed age, education level of parents, parents' job, economic status, residency status, family size, and birth order. Secondly, in order to assess the knowledge, attitude, and behavior regarding dental caries preventive behavior, the researchers accessed one of the valid scientific researcher tools [28] and after reformation, due to demographic differences, they tested the mentioned questionnaire in a sample of students for verifying validity and reliability.

Ten experts were asked to investigate the content validity; after getting their comments and calculation of Content Validity Ratio (CVR) and Content Validity Index (CVI), their amendments to this tool was applied to achieve the desired reliability of the questionnaire. CVI was 0.87 for knowledge questions, 0.88 for attitude, 0.93 for behavior, and 0.89 for the whole questions of questionnaire; CVR was 0.8 for knowledge questions, 0.81 for attitude, 0.75 for behavior, and 0.78 for the whole questions of questionnaire.

This questionnaire was presented to 20 students and its alpha coefficient was calculated. Alpha coefficient was 0.78 for knowledge, 0.76 for attitude, 0.76 for behavior, and 0.7 for the whole questionnaire. Meanwhile, the questionnaire was given to 20 students within a week to test the reliability by means of a test re-test method. The questionnaires were completed by the students; the re-test score was 0.77 for knowledge items, 0.73 for attitude, 0.75 for behavior, and 0.75 for the whole questions of questionnaire.

The questionnaire was amended and its scoring was as follows: in this questionnaire, knowledge part contained of 11 questions based on scale of 3 correct (3 points) and false (1 point) items, and "I do not know" (2 points), respectively. Attitude part was also measured, using 8 questions with 5-point Likert scale from "strongly agree" (5 points) to "strongly

disagree" (1 point) [29]. Behavior part also contained 7 questions and its scoring was as follows: the first 2 points had the best answer, 0 point had the worst answer, and 1 point had the average answer [30]. It is worth noting that brushing behaviors, using dental floss, using mouthwash, and referring to the dentist were studied.

A week before the intervention begins, the questionnaire was given to both groups and, then, based on the results of the first stage, lecture, PowerPoint, demonstration, and role playing were used. Educational intervention was conducted for the experimental group through 2 educational sessions at the school during one week. Also, according to similar studies [31, 32], immediately after and 2 months after the intervention, the questionnaires were completed by the participants in the study. At the same time, the control and experimental groups completed the questionnaire simultaneously. The completion of the questionnaires was self-reported within 30 minutes.

The normality and abnormality of the data distribution was examined, using the Kolmogorov-Smirnov test. The results of Kolmogorov-Smirnov test showed that the distribution of data in the variables of knowledge, attitude, and behavior was abnormal. Then, the test was performed in accordance with the data. Friedman nonparametric test was used to examine the groups in terms of the change in the dependent variable. To compare the experimental group with the control group at each assessment stage, the Mann-Whitney non-parametric test was used for quantitative variables and Chi-square was used for qualitative variables.

## Findings

There was no significant difference between the experimental and control groups in terms of demographic and background variables ( $p>0.05$ ); in other words, the two groups were similar in terms of demographic and background characteristics (Table 1).

The mean ages of students in experimental and control groups were  $11.78\pm 0.738$  and  $11.72\pm 0.847$  years, respectively. There was no significant difference between the mean age of the students in two experimental and control groups ( $p=0.607$ ).

There was no significant difference between experimental and control groups before the intervention ( $p>0.05$ ). But, immediately after and 2 months after the intervention, there was a significant difference between the experimental and control groups in mean scores of knowledge, attitude, and behavioral ( $p<0.05$ ; Table 2).

**Table 1)** Demographic and background characteristics of students participating in the experimental (N=60) and control (N=60) groups (the numbers in the parenthesis are based on the percent %)

Variables	Experimental group	Control group	p-value*
<b>Father's education</b>			
Illiterate	7 (12.1)	12 (20.3)	0.59
Elementary	24 (41.4)	26 (44.1)	
Under the diploma	1 (1.7)	2 (3.4)	
Diploma	19 (32.8)	14 (23.7)	
Associate degree and higher	7 (12.1)	5 (8.5)	
<b>Mother's education</b>			
Illiterate	14 (23.7)	12 (12.1)	0.594
Elementary	30 (50.8)	28 (49.1)	
Under the diploma	6 (10.2)	10 (17.5)	
Diploma	9 (15.3)	6 (10.5)	
Associate degree and higher	0 (0)	1 (1.8)	
<b>Father's job</b>			
Unemployed	20 (34.5)	22 (39.3)	0.931
Worker	8 (13.8)	9 (16.1)	
Employee	11 (19)	7 (12.5)	
Self-employed	16 (27.6)	16 (28.6)	
Retired	1 (1.7)	1 (1.8)	
Others	2 (3.4)	1 (1.7)	
<b>Mother's job</b>			
Housewife	56 (93.3)	56 (98.2)	0.849
Worker	3 (5)	10 (15.4)	
Self-employed	1 (1.7)	1 (1.8)	
<b>Economic status</b>			
Weak	16 (26.7)	14 (24.6)	0.849
Average	19 (31.7)	15 (26.3)	
Good	15 (25)	18 (31.6)	
Excellent	10 (16.7)	10 (17.5)	
<b>Residency status</b>			
Owner	34 (57.6)	40 (67.8)	0.283
Tenant	8 (13.6)	6 (10.2)	
Organizational housing	3 (5.1)	0 (0/0)	
Living with grandparents and acquaintances	14 (23.7)	13 (22)	
<b>Family size</b>			
Up to 3 people	2 (3.33)	3 (5)	0.872
4 people	8 (13.3)	7 (11.7)	
5 people	9 (15)	23 (38.3)	
6 people	22 (36.7)	10 (16.7)	
7 people and more	19 (31.67)	17 (28.3)	
<b>Birth order</b>			
First	14 (23.3)	13 (21.7)	0.924
Second	18 (30)	17 (28.3)	
Third	11 (18.3)	14 (23.3)	
Fourth and higher	17 (28.4)	16 (26.7)	

\* Chi-square test

**Table 2)** Comparison of mean score of knowledge, attitude and behavior during the study period in two groups

Variables	Before intervention	Immediately after intervention	Two months after the intervention	p-value*
<b>Knowledge</b>				
Experimental group	27.51±0.94	29.08±0.95	28.45±0.89	0.038
Control group	27.08±0.95	26.93±0.97	27.21±1.0	0.922
p-value **	0.747	0.012	0.046	-
<b>Attitude</b>				
Experimental group	17.76±0.62	19.65±0.71	18.35±0.40	0.001
Control group	17.00±0.71	17.00±0.63	17.88±0.71	0.358
p-value **	0.106	0.025	0.041	-
<b>Behavior</b>				
Experimental group	10.88±0.57	11.98±0.17	11.34±0.25	0.021
Control group	11.26±1.18	10.14±0.16	9.96±0.173	0.076
p-value **	0.054	0.001	0.001	-

\*Friedman test; \*\*Mann-Whitney test

## Discussion

This study aimed at determining the effect of oral health, using combined training on adopting dental caries preventive behaviors among students of elementary schools in Kootabdollah.

In this study, after intervention, the mean score of knowledge significantly increased in the experimental group and there was a significant difference between these two groups in terms of this variable, indicating the effectiveness of combined training on the knowledge of the students. The results of this section are consistent with the results of studies conducted by Goodarzi *et al.* [28], Peyman *et al.* [21], Peyman and Samiee Roudi [22], Yassaei *et al.* [33], Mohamad Khah *et al.* [34], Sohrabi Vafa *et al.* [35], Babaee *et al.* [36], Wickremasinghe and Ekanayake [23], Kulkarni *et al.* [37], Sanadhya *et al.* [38], Haque *et al.* [39], and Friel *et al.* [40]. Therefore, it can be concluded that education with increasing knowledge can be the first step in the prevention of dental caries and a strongpoint in the promotion of oral hygiene, and with proper training in oral health and its importance, it can be used to promote this goal. In the present study, the mean score for attitude significantly increased in the experimental group and there was a significant difference between these two groups in terms of this variable. The results of this section are consistent with the results of studies carried out by Goodarzi *et al.* [28], Peyman *et al.* [21], Peyman and Samiee Roudi [22], Yassaei *et al.* [33], Mohamad Khah *et al.* [34], Wickremasinghe and Ekanayake [23], Kulkarni *et al.* [37], Sanadhya *et al.* [38], and Haque *et al.* [39]. Attitude plays an important role in oral health. A part of the health behavior of people in each community is affected by their attitude [12]. Therefore, in order to achieve the goals of the preventive program, efforts to improve people's attitudes towards the prevention of oral and dental illness are necessary [13]. Knowledge has a direct relationship with attitude, and with increasing awareness, the level of attitude will be increased [41]. After intervention, the mean score of dental caries preventive behaviors of the experimental group was significantly increased and there was a significant difference between the two groups in terms of this variable. The results of the study are in line with studies performed by Goodarzi *et al.* [28], Peyman *et al.* [21], Peyman and Samiee Roudi [22], Yassaei *et al.* [33], Mohamad Khah *et al.* [34], Karami *et al.* [31], Sohrabi Vafa *et al.* [35], Rahimi *et al.* [42], Wickremasinghe and Ekanayake [23], Kulkarni *et al.* [37], Sanadhya *et al.* [38], Haque *et al.* [39], and Friel *et al.* [40]. It can be said that proper knowledge and attitude toward respecting behaviors related to the prevention of dental caries can act as mediators between supposed results and health-related behavior. Dental caries preventive behavior is significantly and positively related with knowledge and attitude, so that the increase in knowledge and

attitude results in adopting oral health-related behaviors [43-45].

The results of this study indicated the effect of combined education method on oral hygiene; the probably reason is new and varied, leading to the attention of the experimental group to the education and its impact. The results of this section is in line to studies carried out by Khakpour *et al.* [46], Tol *et al.* [16], Afshari *et al.* [47], Amirmohseni *et al.* [48], and Rayati *et al.* [49].

Although the present study is not comprehensive, it can be a good starting point for assessing the combination of different training methods for improving oral and dental health, as the results of this study showed that combined training can improve knowledge, attitude, and adoption of dental caries preventive behaviors. Accordingly, decision-making about educational methods for health issues depends on the time, place, financial, social, cultural, and many other factors and in academic work, there should choose various educational methods for targeted situations and populations. In this study, it became clear that combined training influences the status of oral health. We hope to do similar studies with different methods of training to make the quality and effectiveness of these methods be more and more evident.

According to the time limitation due to the interference of final exams and conducting research, the time was not sufficient and this can be considered as one of the limitations of this study and given the fact that only girl students were studied in this research, there was no possibility to compare the effect of gender on oral and dental health and we hope to have this comparison in future studies.

Because of lack of time (Reaching to the end of the academic year), the author could not use more samples from various grades and genders and more time intervals to compare them. In some cases, questionnaires should be read as an interview with more details for students in order to make the question more clearly to them and there can be recorded appropriate answers. Explaining obstacles and problems of dental health and preventive social beliefs among various populations and various educational groups and grades can be considered in future research works. Regarding the shortage of health experts in Ministry of Education and the effect of health educators on the improvement of dental health performance of students, it is suggested to recruit health experts of Ministry of Health and Medical Education in Ministry of Education in order to take effective steps to improve health behaviors of students.

Given the importance of the consequences related to dental problems, the high cost of treatment and the effect of educational intervention on knowledge, attitude, and behavior are related to oral health; thus, we can have more educational programs by

recruiting personnel of health department for schools that have no health educator or have one but not full time and it is better that school health authorities plan and perform more intervening and effective programs. Similarly, we should adopt appropriate measures and fill the gap of education with emphasis on practical areas of education.

## Conclusion

Combined training can increase knowledge, change attitudes, and improve the adoption of dental caries preventive behaviors that affect oral and dental health of students.

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**Ethical Permissions:** Participation in the study was based on the desire of individuals, and there was no compulsion to continue study whenever people were willing to leave the study. At the beginning, they agreed to participate in the study. For ethical considerations, the research protocol was approved by the Medical Research Ethics Committee of the Faculty of Medical Sciences, Tarbiat Modares University (IR.TMU.REC.1395.452).

**Conflict of Interests:** The authors state that there is no conflict of interest.

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