

Status of Oral Health Education After COVID-19

Jae-hee Kim¹, Ji-won Hwang²

¹ Professor, Dept. of Nursing, Kyungdong University, South Korea, jh6857@kduniv.ac.kr

² Professor, Dept. of Nursing, Kyungdong University, South Korea, chiwon0909@kduniv.ac.kr

Corresponding author: Ji-won Hwang

Abstract: A Study on the research result that 'oral health education has a positive effect on oral health knowledge and oral health behavior' aimed to improve oral health education for 3rd-grade elementary school students in a region where brushing facilities were limited due to COVID-19. This study was a basic survey of 10 people, and SPSS program 21.0 was used for research analysis. It is a fact-finding survey to identify the impact on health knowledge and practice. As a result of the study, knowledge related to oral health showed a high score, but there was no significant change in oral health behavior. In the curriculum, the concept that students did not recognize despite being an essential act for dental health was 'brushing teeth within 3 minutes after eating and brushing every corner for 3 minutes'. At the individual level, it was confirmed that schools need to carry out continuous and repetitive health education programs even in situations of infectious diseases such as COVID-19 so that students can realize the importance of regular health checkups for oral health and practice health management habits.

Keywords: COVID-19, Oral Health Education, Tooth Brushing Restriction, Oral Health Knowledge, Oral Health Behavior, Elementary School Students

1. Introduction

Between 1 and 3 years of age is essential for learning proper brushing and forming oral health care habits through dental education. Since the self-learned and formed oral care habits during this period are the basis for lifelong oral care, it is also a time when oral care health education from parents (caregivers) and the external environment should be appropriately conducted[1]. In the 2030 National Health Promotion Comprehensive Plan, the Ministry of Health and Welfare set a goal of increasing the rate of tooth brushing right after lunch by 2030 from 50.2% in 2018 to 60.0% by 2030. A promotion project is being implemented[2]. In addition, school age is when baby teeth fall out and permanent teeth come out, and since permanent teeth are used for a lifetime, it is worth keeping and preserving them. However, since dental caries increase during this period, it is recognized as an important period in terms of lifetime oral health[3]. Since the mixed dentition of primary and permanent teeth appears in the lower grades, health education for oral care is suitable for lower-grade students in elementary school. Regular dental visits and dental examination experiences during this period help form good habits for dental care[4]. In addition, continuous and repeated oral health education is necessary to establish correct brushing and oral care habits as a self-administered oral health management method[5].

According to the Ministry of Health and Welfare 「Survey on Children's Oral Health」, the average practice rate of brushing right after lunch was 33.3% for 12-year-olds in 2018, and the average number of brushings per day was 2.5 times. In addition, in a survey according to subjective oral health perception

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of 12-year-olds, it was found that 6.9% was very good, 35.2% was good, 46.6% was average, 10.7% was bad, and 0.7% was very bad. It can be seen as good In the same year, the average rate of caries induction in permanent teeth was 6.9% in 12-year-olds, whereas it was 33.9% in 5-year-olds, and it was confirmed that the rate of caries decreased with increasing grade[6]. It was said that the period of education that determines lifelong oral health is formed through health education in elementary school[7]. This indicates the importance of oral health education in elementary school age.

The coronavirus (COVID-19, later known as COVID-19), which began to spread in November 2019, caused a worldwide declaration of a pandemic, which made it mandatory to wear a mask, increasing behaviors that pose a threat to oral hygiene. For example, the reuse of used masks or cloth masks increased the risk of oral infection due to secretions such as saliva, viruses, and bacteria, and the act of drinking water or brushing teeth was restricted due to the situation in which the mask could not be removed, causing oral diseases such as the bad breath. Increased the possibility of causing[8].

Due to COVID-19, the government raised the level of social distancing and emphasized the continued use of masks, and the Ministry of Health and Welfare announced the Ministry of Education's COVID-19 response plan[9], and some schools expanded their application. At school, due to the pandemic situation caused by COVID-19, meals were stopped, and there was a situation where even the water purifiers are not working. This situation continues at this moment, three years later. In addition, if there is a difference in school education due to the pandemic situation caused by COVID-19, it is that the program that used to brush teeth after lunch has been suspended. In elementary school, it was possible to learn theoretically by replacing oral health education with online learning. The opinion of a dentist who suggested that this was not the right decision came out in a newspaper[10].

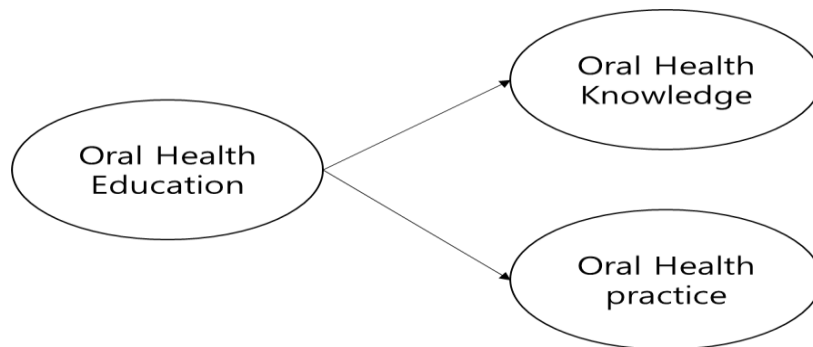
The contents of oral health education learned were not linked to an environment where they could be practiced in school, and lower grade student were limited to brushing their teeth after returning home. As a result, the prohibition of brushing teeth in schools harmed personal hygiene[8]. Recently, studies comparing the effectiveness of oral care health education for elementary school students are increasing. However, most of the research results show high scores in knowledge but no significant change in behavior change[11]. The research result that 'the rate of tooth brushing after lunch in schools with a tooth brushing program is more than twice as high as that of schools without a tooth brushing program' suggests that creating an environment for practicing healthy activities is the driving force for practicing healthy living[8]. In addition, to prevent the increase in dental caries and maintain a healthy oral condition due to the characteristics of school-age children, an oral health management program can change the behavioral aspects of oral care activities in a positive direction, along with accurate knowledge of oral health is essential[12]. To this end, it is necessary to actively strengthen oral health education in schools so that elementary school children can care for their own dental health. It is necessary to continue the program repeatedly to help the self-acquire knowledge of dental health management methods and link the knowledge to oral health behaviors[13]. There was also a study that found that the level of practice of behavior is important for oral health in elementary school students[12], and oral health knowledge and behavior were good, but there was no significant relationship between oral health knowledge and behavior[14]. It was said that education that helps students acquire accurate knowledge about plaque in oral health knowledge and raises awareness of why plaque removal is important is important education[15].

Based on this, in order to prepare for another infectious disease situation in the future, even if they escape the COVID-19 infection state, this study conducted a preliminary investigation by determining that a plan to improve the oral hygiene practice ability and the culture of brushing teeth after meals in the lower grades was needed. In addition, the purpose is to provide evidence that a program linking oral care health education and practice for students in the lower grades of elementary school students (6 to 11 years old) should be conducted regularly and steadily.

2. Research Method

2.1 Research Subject and Study Design

This study is based on the research results that oral health education affects oral health knowledge and oral health behavior[16]. This is a preliminary survey to identify oral health knowledge and behavior after health education, along with brief interviews with the target population. For this purpose, it was implemented with the consent of elementary school students receiving oral health education programs, health teachers, and students practicing health teachers.



[Fig. 1] Study Design

2.2 Research Tool

1) Oral Health Knowledge

Oral health knowledge is the intellectual ability to manage teeth and keep dental health[17]. It means important level. In this study, based on the tool used by Ahn Hye-young and Lee Kot-me (2010) to measure oral health knowledge of school-age children[18], elementary school students, The tool was used after modifying and supplementing so that the questionnaire could be surveyed. To this end, it was conducted with the advice of one elementary school teacher, one dentist, and two nursing professors. There are 12 items, with 1 point for each correct question and 0 points for each incorrect question. The higher the score, the better oral health knowledge.

2) Oral Health Behavior

Oral health behaviors are health behaviors practiced in daily life to maintain and improve the oral cavity[17]. The tool was used after modifying and supplementing it so that it could be surveyed. As a tool, a 4-point Likert scale was used, consisting of 4 points for 'always' and 1 point for 'no', with a total of 9 questions asking about oral health behaviors such as brushing and regular oral examination performance. The higher the score, the more desirable the oral health behavior, so the reliability of the instrument of Hyeyoung Ahn and Kkotme Lee (2010) was Cronbach's $\alpha=.797$, and the reliability of this study was Cronbach's $\alpha=.773$.

2.3 Data Collection Procedure

Applied. To find out the level of understanding of the questions of this research tool, the number of questions, the time required for the test, and the student's responses were followed by a brief interview with ten 3rd-grade elementary school students and a questionnaire about oral health knowledge and behavior, followed by oral health education. Before the training, an explanation and consent form were distributed to the research students and their parents. Interviews and pre-evaluation were conducted for

students who voluntarily agreed to participate. After implementation, oral health education was applied. The duration of this study was from May 24 to May 27, 2022.

3. Data analysis

The data used in this study were SPSS 21.0 program.

- 1) Descriptive statistics of frequency and percentage were used for subjects' general characteristics.
- 2) The average and standard deviation were used for oral health knowledge and attitude according to the subjects' general characteristics.

4. Research results

4.1 General Characteristics

The general characteristics of the subjects are shown in [Table 1]. Six males (60%) and four females (40%). 4 (40%) had experience in oral health education, and 6 (60%) had no education. There were eight subjects (80%) who had visited the dentist for one year and two subjects (20%) who had not visited the dentist. When asked about the frequency of brushing a day, there was no once a day, eight patients (80%) twice a day, and two patients (20%) three times a day. To the question about subjective oral health status, three students (30%) answered healthily, seven students (70%) answered normal, and no student answered unfavorable (0%). Ten students (100%) said they would do it if the school implemented a tooth-brushing program.

[Table 1] General Characteristics (N=10)

General Characteristics	Categories	N	%
Gender	Male	6	60
	Female	4	40
Health education	Yes	4	40
	No	6	60
Dental visit/1year	Yes	8	80
	No	2	20
Number of brushing/days	1	0	0
	2	8	80
	3	2	20
Subjective dental health	Healthy	3	30
	Moderate	7	70
	not healthy	0	0
Implementing a tooth brushing program	Yes	10	100
	No	0	0

4.2 Oral Health Knowledge

The subject's oral health knowledge is shown in [Table 2]. Regarding the question of when to brush your teeth, the standard and standard deviation of the correct answers were $.50 \pm .527$. The correct answer for the time required to brush teeth was $.80 \pm .422$. The correct answer for the brushing method was $.70 \pm .483$. The correct answer rate for foods that tend to cause tooth decay was $.90 \pm .316$, which was relatively high. For the items that were brushing teeth after meals help prevent tooth decay, that eating fruits or vegetables helps dental health, brushing habits before going to bed, and that you should brush your tongue when brushing your teeth, all answered correctly ($1.00 \pm .000$). The item that pain occurs first in the early stages of tooth decay was $.70 \pm .483$. They showed a highly correct answer to the item

that tooth decay should be treated, and that fluoride can prevent tooth decay and dissolve gum bone in case of gum disease (.90±.316).

[Table 2] Oral Health Knowledge (N=10)

Categories	M±SD	Total Correct Responses	Total Incorrect Responses
1. When should you brush your teeth?	.50±.527	1	0
2. How many minutes should I brush my teeth?	.80±.422	1	0
3. How to brush teeth?	.70±.483	1	0
4. What foods cause tooth decay?	.90±.316	1	0
5. Brushing your teeth after meals can help prevent tooth decay	1.00±.000	1	1
6. Tooth decay is painful from the beginning.	.70±.483	1	0
7. Fruits and vegetables are beneficial for dental health.	1.00±.000	1	1
8. You should brush your teeth before going to bed	1.00±.000	1	1
9. When brushing your teeth, you should also brush your tongue.	1.00±.000	1	1
10. Caries get better without treatment.	.90±.316	1	0
11. Fluoride prevents tooth decay	.90±.316	1	0
12. Periodontal disease also melts the bones of the teeth.	.90±.316	1	0

4.3 Oral Health Practice

The subjects' oral health behaviors are shown in [Table 3]. For the behavior item of not eating sweet foods such as soda or candy, the rate of practice was moderate at 2.70±1.160 out of 4 points. For brushing your teeth for about 3 minutes within 3 minutes after eating, the practice rate was not good at 1.800±1.135 out of 4 points. Regarding whether to eat foods that are prone to tooth decay and those that are not, the average score was 2.50±1.080 out of 4 points. The item on the act of attending the dentist and receiving regular checkups was 2.70±1.059 out of 4 points, which was average. Relatively positive responses were given with 3.70±.483 out of 4 points for brushing the inner corners of the mouth when brushing teeth. The behavior of brushing the tongue when brushing teeth was 3.60±.699 out of 4 points, most answered that they were brushing their tongue. The behavior of brushing teeth before going to bed was 3.60±.699 out of 4 points indicate positive behavior about brushing teeth before bed. In response to the question about eating milk, anchovies, and fruits as much as possible, the practice rate was 2.80±1.135 out of 4 points, indicating a moderate practice rate. For the question about the habit of brushing teeth after lunch at school, the practice rate was average at 1.80±1.229 out of 4 points.

[Table 3] Oral Health Behavior (N=10)

Categories	M±SD	Total Correct Responses	Total Incorrect Responses
1. Try not to eat sweet snacks like soda or candy.	2.70±1.160	4	1
2. Brush your teeth for 3 minutes within 3 minutes after eating	1.800±1.135	4	1
3. Distinguish between foods prone to cavities and foods that are not	2.50±1.080	4	1
4. Go to the dentist and get regular checkups	2.70±1.059	4	1

5. When brushing your teeth, brush your teeth to the inner corners of your mouth.	3.70±.483	4	3
6. When brushing your teeth, brush your tongue as well.	3.70±.657	4	2
7. Always brush your teeth before going to bed	3.60±.699	4	2
8. Try to eat as much milk, anchovies, and fruits as possible.	2.80±1.135	4	1
9. I brush my teeth after lunch at school	1.80±1.229	4	1

5. Discussion

Oral health education in elementary school is the basis for figuring out the lifelong oral health status, so it is necessary to continuously provide practice plans to make it a habit[19]. The factors affecting the prevalence of toothache among elementary school students were the habit of brushing teeth, intake of sweet foods, and experiences with dental caries, and it was emphasized that interest and prevention and strengthening of regular dental services are needed[20]. It was said that continuous education is necessary because it is very important to acquire the right attitude and behavior through oral health education in elementary school[21].

This study investigated the knowledge attitude after health education targeting lower grades of elementary school who had limited brushing facilities after COVID-19. The general characteristics of the study subjects were six males (60%) and four females (40%). Most subjects had dental visit experience for one year (80%), and the average number of brushings per day was two times (80%). Most students reported that their oral health was normal (70%). The answer to the timing of brushing teeth in the subject's oral health knowledge was $.50 \pm .527$, the lowest among the knowledge questions. This would be a case where you only have knowledge about brushing your teeth but do not know the exact timing of when to brush them. Foods prone to tooth decay ($.90 \pm .316$), brushing teeth after meals ($1.00 \pm .000$), fruits and vegetables ($1.00 \pm .000$), brushing teeth before bedtime ($1.00 \pm .000$), brushing the tongue ($1.00 \pm .000$) were aware of the importance. In general, the importance of brushing teeth and essential knowledge about dental health were found to be high, but when to brush teeth ($.50 \pm .527$), how much ($.70 \pm .483$), and what may appear after tooth decay occurs, knowledge of symptoms ($.70 \pm .483$) showed a lower score than other items. In addition, 100% of the students said they participated in the brushing program led by the school. This is a message that informs important points in the contents of oral health education for elementary school students. It is a message that indirectly informs you that you do not know how important it is to brush your teeth within 3 minutes after eating. It is also a message that the concept of tooth decay is not ingrained in students. This can be seen as a research result that shows that in implementing oral health education, there is a need for behavioral correction education that can lead to actual behavior, not education in the classroom. It is necessary to educate students in the lower grades of elementary school at the level of education, and it is thought that a program that corrects the behavior of students on how to brush their teeth 1:1 along with video education that can be visually shown during education will be effective. Since it is not accurate to judge whether a student's behavior is good or bad after education, an early business model that can confirm and correct it must be introduced. This should not be left only to the health teachers who operate the health education program, but it is necessary to develop a program in which homeroom teachers can take an interest in and correct behaviors centered on health teachers, and follow-up studies to confirm the effectiveness are needed.

This suggests that it is an important program that can lead to all actions without buying antipathy for the actions of teachers in the lower grades. This shows that the results of the study[15] that parents'

behavior influences the behavior of younger students are the same. Among the items on oral health behaviors, the lowest score was brushing teeth for 3 minutes within 3 minutes after eating (1.800 ± 1.135) and brushing teeth after lunch (2.80 ± 1.135). In addition, the behavior of not eating unhealthy foods (2.70 ± 1.160) and the behavior of receiving regular checkups at the dentist (2.70 ± 1.059) were found to be expected. The act of brushing the corners when brushing teeth (3.70 ± 0.483), the act of brushing even the tongue (3.60 ± 0.699), and the act of brushing teeth before going to bed (3.60 ± 0.699) were found to be practiced relatively higher than other items. Through this, a continuous health education program that can develop the habit of brushing teeth in elementary school should be applied, and it is thought that additional education for parents is needed to develop the importance and habit of brushing teeth continuously at home.

The results of this study are compared to a study[22] that emphasizes that oral health education conducted in schools is a crucial part of maintaining and promoting oral health. This study confirmed that the period of oral health education for elementary school students is the same as the concept that it is a necessary period. In the concept proposed in the systematic literature review of domestic oral health care programs for elementary school students[22], motivational education is essential. However, it is emphasized that continuous oral care programs should be included. Although there have been many mentions of the importance of oral care programs for elementary school students, studies based on them were cited as a limitation. It was suggested that oral care program intervention effects were all due to changes in oral health knowledge and behavioral awareness and that oral care programs were essential in bringing about desirable behavioral changes. The most important point is that rather than changing behavior only through knowledge transfer, it was suggested that a program that can affect long-term behavioral change is effective so that there is a change in awareness through motivation for dental health by diversifying intervention methods[17]. A study of elementary school students in Jeonju City also suggested that oral health knowledge and behavior were good. However, the development and application of an oral health education program that could promote these behaviors were needed[23].

When comparing the well-equipped oral health service as part of the school health program with other developed countries with a well-developed social security system, Korea still lacks a lot of oral health personnel as it is operated in the form of business trips[21]. As a way to effectively operate school oral health, it was restricted to place dental hygienists, who are oral experts, in schools[24]. However, this is sufficient health education as a health teacher, and based on the research results[24] showing that 'how to brush your teeth' and 'how to prevent tooth decay' are highly educational in the oral health education preference, these educational contents should be considered for oral health education for elementary school students in the future. If more education is added, it is thought that it will be an effective health education.

6. Conclusions and Suggestions

This study was conducted as a preliminary investigation on the direction of health education affecting oral health knowledge and behavior of elementary school students. Based on this, it was confirmed that health education for the lower grades of elementary school should be provided based on the educational needs, and environmental factors that can practice this are also important. It was confirmed through a preliminary investigation that the tooth brushing program, which can have a lasting effect on students' behavior, should not be stopped under any circumstances in the situation where tooth brushing facilities were temporarily restricted in the corona situation among the lower grades of an elementary school in one area.

This study recognizes the importance of brushing teeth to identify the impact of oral health education on oral health knowledge and oral health practice for elementary school students who have been restricted from providing brushing facilities after lunch due to the pandemic caused by COVID-19.

Knowledge is essential, but significantly, it has been confirmed that a health program that can link this to action is an essential element of practice. In addition, during oral health education, the critical concept of dental care, which students did not recognize, was brushing their teeth within 3 minutes after eating and brushing every corner for 3 minutes. It was confirmed that there is a need to find out essential concept's students do not know and emphasize them through education. Through this study, it is thought that students can realize the importance of oral health checkups and provide essential data for developing programs that can practice them with their parents. In addition, even in an infectious disease situation such as COVID-19, elementary school health teachers need to recognize the need for a continuous health education program and develop a program that focuses on the contents of items that students do not know well and can naturally link to practice. In addition, it is judged that further research is needed to confirm the importance of health education in oral health knowledge and attitude by conducting additional research on behavioral changes before and after health education. It is judged that a preliminary investigation into the act is also necessary.

Although it was only a preliminary survey due to the small number of samples of study subjects, it was confirmed that a continuous oral health program should be conducted in schools. In addition, since most elementary school students had good oral health knowledge and behavior, it would be good to develop and apply an oral health education program that can practice this. This study confirms a small number of elementary school students in one city and one region, so caution should be exercised, and a repeat study with a larger sample is suggested.

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