

## Impact of School Dental Health Education Programme on Elementary School Students in Kartasura, Indonesia

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### Abstract

In Indonesia, children aged 5–9 years are the largest group who experience dental caries. Oral health problems can be overcome by increasing knowledge, behavior, and oral hygiene status. Schools are one of the largest channels for providing health education to children. The aim of this study was to determine the effectiveness of school dental health education programs on the knowledge, attitudes, practices, and oral hygiene status of elementary school students.

This research is a quasi-experiment with pre and post tests without control group design. The research was conducted on 310 elementary school students in Kartasura, Central Java. Dental health education is carried out for three months. Variables were measured before and after the intervention. Knowledge, attitude, and practice (KAP) were measured using a questionnaire, and oral hygiene status was measured by PHP-M index. KAP data were analyzed using the Wilcoxon signed rank test and PHP-M using the Paired T-Test.

The results showed an increase of knowledge (p-value=0.00), attitude and practice (p-value = 0.02); and a decrease in the mean of PHP-M (p-value = 0.01) after the intervention. In conclusion, school dental health education programs are effective in increasing the knowledge, attitudes, practice and oral hygiene status of elementary school children.

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### Introduction

The Global Burden of Disease Study estimates that nearly 3.5 billion people worldwide experience dental and oral health problems. It is estimated that around 2.3 billion people suffer from permanent dental caries, and more than 530 million children suffer from primary dental caries.<sup>1</sup> World Health Organization (WHO) states that 60–90% of children in the world experience dental caries.<sup>2</sup> As many as 57.6% of Indonesia's population experiences dental and oral problems, including caries, swollen gums, bleeding gums, ulcer, and loose teeth. Of all existing dental health problems, the largest proportion of problems suffered by the Indonesian population are caries (45.3%). The age group of 5–9 years (67.3%) is the largest group with oral health

problems.<sup>3</sup> In addition to infections and pain, children with poor oral health face major barriers to academic success, often missing school and having trouble concentrating in class.<sup>4</sup> This can cause a decrease in the quality of life for children.<sup>5</sup>

The majority of the Indonesian population (94.7%) already has the habit of brushing their teeth every day, but only 2.8% of the population brushes their teeth at least twice, after breakfast and before going to bed. From this percentage, the least proportion of the population brushing their teeth at the right time is in the age group of 5–9 years.<sup>3</sup> Oral health behavior is influenced by knowledge and awareness of oral health.<sup>6</sup> Knowledge can be obtained by providing education. School is an important platform for learning. Schools are also one of the largest channels for providing health education to children.<sup>7</sup> Several countries have developed a "health school concept" and a "health-promoting school concept" as strategies to promote oral health.<sup>8</sup> For school-age children, school-based approaches are more common and effective in

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providing preventive care than community-based approaches. School-based oral health education has been successfully implemented in several developing countries to achieve better oral health behavior and dental hygiene status in children at a low cost.<sup>9</sup>

In Indonesia, the declaration of a caries-free Indonesia in 2030 by the Ministry of Health of the Republic of Indonesia has caused the government to develop a strategy to increase promotional and preventive efforts for dental and oral health services.<sup>10</sup> One of the efforts that can be made to target schoolchildren is to provide education in the school environment. School dental health education (SDHE) aims to increase children's knowledge, positive attitudes, and behaviors related to dental and oral health.<sup>11,12</sup> This education should be the first step in efforts to prevent dental caries.<sup>13</sup>

The Faculty of Dentistry, Muhammadiyah University of Surakarta, performs community service by developing a school dental health education program at the Kartasura sub-district elementary school in Central Java. Selected elementary school teachers and students ("little dentists") were given dental and oral health education. Teachers and "little dentists" who have been trained are expected to be able to provide education to other students.<sup>14</sup> This research was conducted in order to evaluate the activities of the school's dental health education program. This study aims to determine the effectiveness of school dental health education (SDHE) programs on the knowledge, attitudes, behaviors, and oral hygiene status of elementary school students.

## Materials and methods

### Study design and sample

An intervention study was planned with a quasi-experimental design with a pre- and post-test design without a control group design. The protocol was approved by the Health Research Ethics Commission, Faculty of Medicine, University of Muhammadiyah Surakarta (No 4703/B.2/KEPK-FKUMS/II/2023), Indonesia. This intervention was carried out for 3 months, from Desember 2022 to March 2023.

Third grade school children aged nine years from elementary school in Kartasura District, Central Java, were included in this study. The study protocol was explained to the school

authorities, and written informed consent was obtained. Sample size estimation was carried out based on the Lemeshow formula. The significance level was set at 95% power. An estimated sample size of at least 290 children is required for the study. The sample size was increased by 10% in anticipation of a reduction over the intervention time period. Children of parents who gave informed consent participated in this study. Children with special needs were not included in the study.

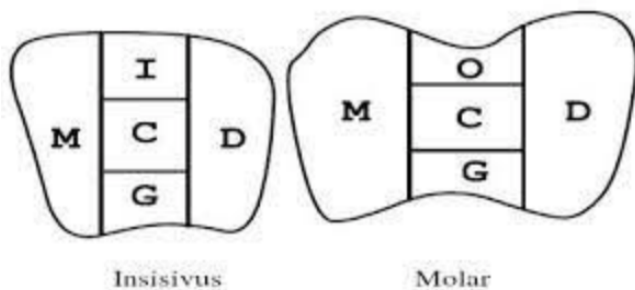
Knowledge, attitude, practice (KAP) questionnaire

A closed questionnaire was prepared with references from Geetha Priya *et al.*<sup>11</sup> to measure KAP related to children's oral health. The questions were modified by dentists and academics and adapted to the Indonesian setting. The questionnaire was presented in Indonesian. Test the validity and reliability of the questionnaire and generate 12 questions about oral health: 5 questions of knowledge (K1–K5) and 7 questions of attitudes and attitude practices (AP1–AP7). Questions focused on the frequency of tooth brushing and snacking, the effect of sugar and soft drinks on teeth, how to maintain oral hygiene, the importance of cleaning the tongue, the importance of regular visits to the dentist, and the experience of pain or discomfort in the oral cavity. Students were instructed to fill out a questionnaire by selecting the appropriate answer. The time given to complete the questionnaire is 10–15 minutes. Data were collected at baseline and at the end of the third month. Correct answers are given a score of 1, and wrong answers are given a score of 0.

Oral Hygiene Status with PHP-M index

Oral hygiene status was measured using PHP-M (Personal Hygiene Performance-Modified). This method is often used for dental and oral hygiene checks in mixed dentition. The index teeth used in the PHP-M examination include: 1) most posterior teeth that grow in the maxillary right quadrant; 2) primary or permanent maxillary right canines; if these teeth are not present, other anterior teeth can be used; 3) Primary maxillary left first molars or maxillary left first premolar; 4) most posterior teeth in mandibular left quadrant; 5) Primary or permanent mandibular left canine; if these teeth are not present, other anterior teeth can be used; 6) Primary mandibular right first molar or mandibular right first premolar.

The examination begins with the application of a disclosing solution to the surface of the child's teeth. The children are asked to rinse their mouths with water to remove excess disclosing solution. Furthermore, the research team examined the presence of plaque, which was marked by the color of the disclosing solution that was still attached to the teeth. The assessment begins by making imaginary lines on the teeth so that they form five imaginary lines. Teeth were assessed on the lingual and labial surfaces. If a plaque is visible in one area, then it is given a score of 1, if there is no plaque, it is given a score of 0. The results of the plaque assessment are calculated by adding up each plaque score on each tooth surface, so that the plaque score for each tooth can range from 0-10. The plaque score for all teeth can range from 0 to 60.



**Figure 1.** Five tooth surface subdivisions in PHP-M.

**SDHE program**

SDHE program intervention was carried out with the help of teachers and students (little dentists) who had been previously trained. They deliver oral health education in their respective schools and brush their teeth together every week for three months. Health education sessions are adapted to school conditions so that school schedules are not disrupted. Providing education information about the causes and consequences of dental caries and other oral health problems, how to prevent oral health problems, healthy eating habits, and the importance of regular dental visits explained through SDHE.

**Results**

Consent forms signed with parental authorization were returned by each of the 325 children who participated. Of these 325 participants, fifteen were excluded because of

the child's uncooperative behavior during the clinical examination or for not filling out the pretest posttest questionnaire completely, leaving 310 students aged 9 years (52.6% female). Table 1 shows the percentage of correct answers given by children regarding oral health knowledge questions. After 3 months, there was an increase in the percentage of correct answers for all knowledge questions. Correct responses for K4 (p = 0.01) and P5 (p=0.02) increased significantly after 3 months.

Question	Baseline (n=310)	Follow up (n=310)	p-value
K1. Regular visits to the dentist can help maintain healthy teeth (correct)	299 (96.4)	304 (98,1)	0.22
K2. Chewing sweets, candies, and chocolate can't make cavities (wrong).	262 (84.5)	268 (86.4)	0.46
K3. Carbonated drinks are not good for dental health (true).	262 (84.5)	286 (92.3)	0.01*
K4. It is important to clean the tongue regularly (correctly).	286 (92.2)	293 (94.2)	0.19
K5. When should we go to the dentist? (every 6 months)	103 (33.2)	138 (44.5)	0.02*
Cumulative score of 5 question (mean ±SD)	3.9±0.78	4.1±0.70	0.00*

**Table 1.** Children's responses to knowledge questions related to oral health, by percentage. p<0.05.

Table 2 shows the percentage of answers given by children to questions about oral health attitudes and practice. There was a significant improvement in the preferred choices for AP7 (p-value = 0.01).

Question	Baseline(n=310)	Follow up (n=310)	p-value
AP1. How many times do you brush your teeth in a day?(twice a day)	273 (88.06)	279 (90.00)	0.42
AP2. How long do you brush your teeth? (2 minutes)	174 (56.13)	176 (56.74)	0.85
AP3. How many times do you eat snacks in a day? (when hungry)	226 (72.90)	235 (75.8)	0.46
AP4. How is the condition of your teeth and gums? (Good)	262 (84.52)	264 (85.16)	0.59
AP5. Do your gums bleed when you brush your teeth? (No)	250 (80.64)	262 (84.52)	0.07
AP6. How often have you experienced pain in your teeth and gums in the last 3 months? (Never)	112 (88.06)	119 (38.39)	0.52
AP7. What is your reason for going to the dentist? (routine control)	85 (27.42)	111(35.80)	0.01*
Cumulative score of 7 question (mean ±SD)	4.47±1.25	4.69±1.50	0.02*

**Table 2.** Children's responses to attitude and behavior questions related to oral health, by percentage. p<0.05.

Table 3 shows the average decrease in PHP-M after the intervention, from 27.8±10.42 to

26.69±9.87 (p-value = 0.01). The PHP-M index is used to see the accumulation of plaque in the oral cavity. It can be concluded that there is an increase in oral hygiene status after SDHE.

PHP-M	Mean ±SD	p-value
Baseline	27.80±10.42	0.01*
Follow up	26.69±9.87	

**Table 3.** Results of the PHP-M index statistical test before and after the intervention. p<0.05.

## Discussion

Dental and oral health problems that are often found in schoolchildren (age 6–12) are caries and periodontal disease.<sup>15</sup> The high prevalence of morbidity and poor dental and oral health status of students is caused by a lack of dental and oral health education and inadequate preventive measures.<sup>9</sup> Prevention efforts need to be made to reduce the incidence of oral health problems. WHO recommends school oral health programs (SOHP) as a practical means of reaching schoolchildren, promoting oral health, and reducing inequalities in oral health. SDHE development is based on the application of the Preceed Procead Model (PPM) to change the dental health behavior of school children.<sup>16</sup> In this study, we looked into how SDHE affects schoolchildren. We selected the factors of knowledge, attitude, practice, and dental health status to evaluate program effectiveness (impact evaluation). Overall, children's dental health is getting better.

Treatment or intervention containing a stimulus will change a person's behavior. Health starts at the cognitive stage (knowledge), that is, someone knows to respond to the stimulus given in the form of material and generate new knowledge. The next process is an inner response in the form of an attitude. In the end, the stimulus will be fully realized, cause further responses, and be shown in the form of action. SDHE is a program that contains a stimulus that is expected to increase knowledge and change children's behavior in maintaining dental and oral hygiene so that students' oral hygiene status becomes better.<sup>17,18,19</sup>

This research is based on the KAP model (knowledge, attitude, and practice), where knowledge is the basis and influences a person's attitude, while attitude will influence a person's behavior. The results of the study stated that

there was an increase in students' knowledge, attitudes, and practice after being given an intervention for three months. Knowledge is an important part of shaping one's actions, so behavior based on knowledge and full awareness will be easier to remember than behavior that is not based on knowledge and awareness. Increasing knowledge about dental and oral health will affect positive attitudes and actions toward maintaining dental and oral health.<sup>20</sup> The aspect of knowledge that has increased in this study is related to carbonated drinks, which are not good for dental health. These types of drinks have a low pH and a high sugar content. The content of citric acid in soft drinks can dissolve calcium and phosphate in tooth enamel, which is the initial process of tooth hard tissue damage.<sup>21</sup> Aspects of knowledge, attitudes, and behavior regarding visits to the dentist have also increased significantly. The importance of regular visits to the dentist for early detection of oral problems and preventing the disease from getting worse. Preventive oral health care is better than a curative approach because oral health education programs play the most important role in prevention, and schools are an effective place for this education.<sup>22</sup>

Some of the media used in SOHD include handbooks, posters, storybooks, and props that can be used by teachers and little dentists. All of these media are used to help them plan and deliver comprehensive dental health education. The use of educational media can increase knowledge because it can facilitate children's understanding and is more interesting than boring.<sup>23</sup> For three months, participants in this study brushed their teeth once a week. One key component of this program is tooth brushing exercises. The program's goal is to improve and inspire students' attitudes toward dental and oral health so that they will later adopt these views as child behaviors.<sup>24</sup> Positive oral health attitudes and behaviors are closely related to good oral health.<sup>22,24</sup> Good oral health is important for increasing self-confidence, quality of life, and success in life.<sup>25</sup> In this study, plaque levels significantly decreased after weekly brushing sessions led by the teacher and the little dentist. This is in line with Potisomporn, *et al.*<sup>24</sup> who stated that there was an increase in the ability to brush teeth and a decrease in plaque index after getting a weekly brushing session. In addition, Petersen *et al.*<sup>26</sup> demonstrated that teachers who

gave children daily dental hygiene lessons dramatically reduced their ratings for gingival bleeding.

The need to promote dental and oral health in schools is important and can be integrated into the learning curriculum and school activities.<sup>27</sup> Healthy behaviors and lifestyles formed at a young age will be more sustainable; thus, schoolchildren should be provided with skills that enable them to adopt a healthy lifestyle.<sup>25</sup> School teachers are considered for health education because of its availability and the constant reinforcement children will receive.

Our investigation has several limitations. Time, money, and human resources are a few among them. Time restrictions prevented an evaluation of the caries state. Change cannot be measured. The outcomes may also be impacted by the knowledge levels of the youngsters in various subject areas. Collaboration among schools, instructors, and students is necessary for this program, which is based in the classroom. The curriculum of the school, the organization and priorities of the school, the number of pupils, the workload of the teachers, and other factors could all affect the outcomes. Teachers in schools and little dentists also mentioned obstacles, such as a lack of specialized knowledge, time, support, resources, and infrastructure.

## Conclusions

School dental health education programs are effective in increasing the knowledge, attitudes, actions, and oral hygiene status of elementary school children.

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## Declaration of Interest

The authors report no conflict of interest.

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