

The Relationship of Oral Health and Behavioral Change in Elementary Students

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Abstract

The maintenance of dental health for schoolchildren is generally associated with various parties most involved with students' oral health problems, namely, parents and teachers, especially those involved in the School Oral Health Program (SOHP) and dental health education. To identify the relationship between the SOHP and the behavior in students in first- and second-grade. This research involves a quasi-experimental study with pre-test and post-test design using data for 170 first- and second-grade students at an elementary school in a suburban of Jakarta, the capital city of Indonesia. The data, gathered during SOHP program intervention at the school, were processed statistically using SPSS. Using the Wilcoxon test, a significant relationship ($p = 0.001$) was identified through a comparative analysis of plaque, behavior, knowledge, attitude and action scores from before and after intervention. Using Spearman's rho test, the results of the correlation analysis between plaque and behavior scores before intervention showed no significant correlation ($p = 0.114$), while the results of the correlation analysis between plaque and behavior scores after intervention was $p = 0.001$, which shows a significant correlation with a correlation coefficient of -0.311 . There is a correlation between participation in the SOHP and changes in dental health behavior among the study subjects.

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Introduction

The Indonesian Basic Health Research in 2013 found that oral disease is one of the major diseases affecting Indonesian society.¹ The DMFT index among Indonesians ages 12 years old and older is 4.6, with DT = 1.6, MT = 2.9 and FT = 0.08.¹ The prevalence of dental caries in 2013 was higher than the prevalence of dental caries in 2007, with incidence increasing from 43.4% in 2007 to 53.2% in 2013.^{1,2} Oral health is an essential part of general health and an important factor that impacts quality of life.³ Dental caries among preschool children is a complex and multifactorial disease affected by a variety of risk factors. The main risk factors involves a combination of factors including diet, a susceptible host, and microflora, which interplay with a variety of social, cultural and behavioral factors.⁴ The

status of oral health in children, particularly school-aged children, is generally worse than that for adults, so maintaining dental health among this population requires special attention. Oral hygiene factors affect the incidence of dental caries: failure to maintain oral hygiene will facilitate the formation of plaque on tooth surfaces, which is one of the factors triggering the occurrence of dental caries.⁵ Acid production by the bacterium *Streptococcus mutans* in biofilm is one of the trigger factors for dental caries, and it is the most important risk factor in the tooth demineralization process.⁶

Behavior or neglect of oral hygiene is among the causes of oral and dental problems in children; the basis for these causes is lack of knowledge about the importance of teeth and mouth maintenance. Children are still dependent on adults in terms of maintaining oral hygiene and health. In addition to the child's behavior, the behavior of adults is also related to children's behavior in dental health. Consequently, parents and teachers play an important role in maintaining the oral health of children.⁷ The maintenance of dental health among students is generally associated with the role of the various

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parties closest to their dental health problems, that is, parents and teachers, particularly through their involvement in the SOHP) and in health education.⁸ The SOHP is a public health effort aimed at maintaining and improving the oral health of all students at partner schools, and includes individual health efforts in the form of curative measures for individuals (students) who need oral health care.⁹

The SOHP in Indonesia has a guide created by the Ministry of Health. However, the implementation of the Indonesian SOHP has so far seen questionable success, as evidenced by the continued high prevalence of dental caries in the country. The National Basic Health Research data from 2013 showed that almost 90% of children in Indonesia were affected by dental caries, which typically indicates non-treatment of dental and oral conditions. The research found that 25.9% children had oral and dental problems, and most of them are between the ages of 5 and 9 years old.¹ School children should have been covered by health facilities, but implementation of SOHP is still not optimal. A visit from the health center takes place only once a year. Teachers have received little training from the department of education or department of health about the oral and dental health services and resources they should provide. Parents and teachers play an important role in influencing children's behavior in health maintenance, including maintenance of dental health.¹⁰ Parents play a role by monitoring children's behavior at home, providing examples of dental care, offering motivation and taking children to the dentist for regular checkups or care. Teachers, meanwhile, act as counselors, instructors and role models in, among other things, dental care.⁸ Therefore, this study aims to identify the relationship of the SOHP program to oral health behavior in school children.

Materials and methods

The research subjects for this study were first- and second-grade children between the ages of 6 and 9 at an elementary school in Depok, the suburban of the capital city of Indonesia. Information about subjects was retrieved by using the *total sampling method*. This method used questionnaires about children's knowledge, attitudes, and actions at both the beginning and the end of oral health education; data also came from plaque screenings at the beginning and the

end of the education program, plaque self-examinations using disclosing solution, and mass teeth brushing (Table 1). All programs were guided by each classroom's teacher.

Data obtained for 170 students included details for each student's plaque scores before and after intervention, as well as attitude, action and knowledge scores taken by a dental clinician before and after the intervention. The SOHP intervention included education about brushing teeth properly, mass teeth brushing, dental health education and independent plaque screening by students. The aim of the intervention, guided by each classroom teacher, was to educate students to change their behavior to become more concerned about their oral health. Data about behavior and plaque scores were statistically processed using SPSS, then analyzed for presentation in this study.

Results

This study covers a total of 170 students, including 80 first-grade students and 90 second-grade students, with 113 between the ages of 6 and 7, and 57 between the ages of 8 and 10. The subjects included 92 males and 78 females. In Table 2, the p-value test results in a number < 0.05 ; using the Wilcoxon test, this indicates that the plaque score, attitude score, action score, knowledge score, and behavioral score mean between the initial and final tests show statistically significant differences.

In Table 3, Spearman correlation test results on initial behavior and initial plaque score are > 0.05 ; this indicates there was no significant correlation between plaque scores and attitudes, actions and prior knowledge scores. Table 3 also shows the correlation test results between final behavior and final plaque scores to have a p-value > 0.05 ; this indicates there is a significant relationship between plaque scores and scores of attitudes, actions and final knowledge. Moreover, the negative correlation coefficient indicates a reverse relationship between the scores; in other words, if one variable decreases, the other will increase. The correlation coefficient of -0.311 indicates a weak relationship. This indicates that, for every increase of one unit in the behavior score variable, the plaque score variable will decrease by 31.1%. These results were obtained using the Spearman correlation test.

Question	Answer
Have you ever led a mass tooth brushing for elementary school students?	Four teachers had never led a mass tooth brushing.
Do you ever lead a mass mouth rinsing with fluoride solution for elementary school students?	Four teachers have never led a mass mouth rinsing using fluoride solution for elementary school students.
Do you ever provide oral health education to elementary school students?	Four teachers never provided oral health education to students.
Do you think SOHP activities are helpful?	Four teachers said they were aware of the importance of SOHP activities in school but believed its implementation was poor.
Do you think student empowerment is required?	Four teachers said a doctor program is not necessary for SOHP implementation
Do you ever discuss the SOHP program with students' parents?	Four teachers had never discussed the SOHP program with students' parents.

Table 1. Qualitative questionnaire results of first- and second-grade elementary school teachers.

Variable	Mean	SD	p-value*
Plaque score			
Initial	1.78	0.05	0.00
Final	1.13	0.04	
Attitude Score			
Initial	2.22	0.06	0.00
Final	3.37	0.07	
Action score			0.00
Initial	2.75	0.07	
Final	3.71	0.03	
Knowledge score			
Initial	2.60	0.07	0.00
Final	3.71	0.03	
Behavioral score			
Initial	7.61	0.15	0.00
Final	10.8	0.90	

Table 2. The results of two pairs mean comparative test, at the beginning and the end of intervention. *p<0.05

	Initial plaque score		Final plaque score	
	p-value	Correlation coefficient	p-value	Correlation coefficient
Initial behavior	0.114	-0.122	-	-
Final behavior	-	-	0.000	-0.311

Table 3. Correlation test results between plaque and behavioral score of students.

Discussion

Prior to this research, some SOHP program education had been conducted by the teachers, although not to a full extent. During interviews with teachers, it was noted that they had provided some health counseling to students and were aware of the importance of the SOHP program in school. However, the SOHP education has not been conducted in accordance with SOHP procedures. Dental health counseling that

should be provided to students at least once a month does not occur regularly. Teachers have never led a mass tooth brushing on a daily basis in accordance with the available guidelines. Emergency treatment and oral health networking for administering surface protection and references also has never been provided. Thus, it can be concluded that the SOHP program in SDN Kukusan has not been optimally implemented and needs special attention.

The results show a 36.51% decrease in plaque scores after 28 days; i.e., after the subjects had followed the SOHP education about how and when to brush their teeth. This result was statistically significant, as indicated by the Wilcoxon test results with a p value < 0.05. This is in accordance with a study by Hebal et. al. (2011) that found subjects were able to decrease plaque scores after a period of education.¹² The behavior changes reflected by the sum of knowledge, attitudes and actions scores showed a significant increase from 7.61 to 10.8 (41.91%) after education through the SOHP program. This result could be due to the subjects learning from information communicated via the SOHP program.

The significant increase in knowledge scores from the beginning to the end of the study could be caused by the large number of students who paid attention to the educational materials and programs provided through the SOHP initiative, resulting in students becoming familiar with the importance of maintaining their oral health. Meanwhile, the significant increase in attitude scores indicated that students' understanding of the educational material also led to individual changes in students' attitudes toward oral health. Good habits adopted by students over time mean that actions also improve, as shown by significant increases in action scores. In this study, attitude scores tend to be lower than action and knowledge scores. This could be because the students have yet to fully understand the importance of oral health despite having acquired adequate knowledge. The increase in action scores was caused by a guided response to direct instruction by teachers to perform oral and dental healthcare, although students might not have fully understood the usefulness of such maintenance. In Stimulus-Organism-Response (S-O-R) theory, the SOHP program serves as a stimulus to the organism (in this case, the students). The stimulus provided can be denied

or accepted. If the stimulus is not accepted or is rejected, this means it could not effectively influence individual attention and will stop at this stage. But when a stimulus is received, this indicates there is interest by the individual and the stimulus is thus effective. When a stimulus attracts an organism's attention (i.e., it is acceptable), the organism understands, and the stimulus will be continued to the next stage. After that, the organism processes it so there is a willingness to act in favor of the stimulus that has been received (i.e., it takes action). Finally, with supported facilities as well as with encouragement from the environment, the action effect from that individual (behavioral change) in this case means that students change their oral health behavior.

The Spearman test results to identify the relationship between plaque scores and attitude, action and knowledge scores in the beginning showed a p value > 0.05 , which means there is no relationship between initial plaque scores and a subject's attitudes, actions and knowledge scores. However, correlation test results to find the relationship between plaque scores and attitudes, actions and final knowledge scores showed a p value < 0.05 , which means there is a significant relationship between them, with a weak correlation (correlation coefficient = -0.311) in a reverse direction. This is in accordance with a study by Anil et. al, who found that plaque score reduction most likely happens because information or education received by children contributes to the improvement of their oral hygiene.

In the theory of behavioral change, an individual undergoes five stages of change. However, the stages for students in this research cannot be determined because they vary by individuals. Nonetheless, the SOHP program is expected to trigger the process of behavioral change for each student. Changes in behavior can be seen from the significant positive changes observed in the plaque scores and behavior scores. Consequently, SDN Kukusan students appear to have achieved the action stage by the end of this study. Generally, it's likely that positive changes can be effected due to better implementation of the SOHP program with a teacher's guide. The analysis carried out was in accordance with the hypothesis that the SOHP program may be related to changes in student behavior, which was demonstrated by a

decreased in student plaque scores and an increase in attitude, action and knowledge scores.

The current 28-day study can be expected to provide adequate opportunity for knowledge retention among students at SDN Kukusan. Indications that the SOHP program has not been optimally implemented at SDN Kukusan can be seen by the improvements in plaque scores and attitude, action and knowledge scores after the SOHP program was led for 28 days using the classroom teacher's guide. If the SOHP program continues as a sustainable program, it is likely the dental health status of first- and second-grade students will continue to improve.

One problem is that this is not only the responsibility of the school, but also the responsibility of the Education Office that should provide training to primary school teachers and students' empowerment. This is important so long-term targets of the SOHP program can be achieved by 2020. The limitations in this research and the sub-optimal implementation of the SOHP program in SDN Kukusan might be due to the absence of a specific schedule for conducting SOHP education; according to the SOHP guidance by the Indonesia Ministry of Health, a mass tooth brushing for first-, second- and third-grade students should be performed every day. This can be done if schools get used to performing tooth brushing together in the classroom before class starts, with a single rinse technique method that only takes only about five minutes, so there is a minimal impact on lesson time. Another limitation of this study is the research design using quasi-experimental design, which makes it difficult to control whether changes occurred due to the SOHP program or whether there are other variables that contributed.

Conclusion

Based on the results of this study, the following conclusions can be drawn: at the beginning of this research, 40.6% of students had a medium behavior score and 34.7% of them had a good behavior score, whereas at the end of the study, 5.3% of students had a medium behavior score and 58.8% had a good behavior score. The average behavior score increased significantly for 43.51% ($p < 0.05$) after the SOHP program was conducted for 28 days. The plaque scores of subjects were reduced for 36.51% ($p < 0.05$), a statistically significant result

after the 28-day SOHP program. The average knowledge score increased significantly for 42.69% ($p < 0.05$) after the 28-day SOHP program, while the average attitude score increased significantly for 51.80% ($p < 0.05$) and the average action score increased significantly for 34.90% ($p < 0.05$). Teacher perceptions of the SOHP program were good, although they believed the program at SDN Kukusan was not optimally implemented. There is no relationship between initial plaque and behavior scores of students before the SOHP educational program. There is a significant relationship ($p = 0.05$, $r < -0.311$) between the final behavior score and the final plaque score after the program was concluded. To implement the SOHP program successfully, it is necessary to provide continuous teacher guidance to maintain oral health behavior. There is also a need for special hours to provide a routine SOHP program, and this can be helped by local Educational Authorities policies assisted by local health centers. Further study with more subjects and a broader scope is needed to provide better research results. The SOHP program could be improved to more sustainably help maintain student's oral health behavior by continuously monitoring and measuring the stages of maintenance behaviour change.

Declaration of Interest

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