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The Use of Smart Dental Box in Increasing Knowledge About Dental Caries

Nadia Agda Alifia^{1*}, Sunomo Hadi², Silvia Prasetyowati³

Department of Dental Health, Poltekkes Kemenkes Surabaya, Indonesia

**Corresponding author: nadiaagda123@gmail.com*

ABSTRACT

Background: Dental caries is defined as the destruction of the enamel layer of the tooth by the production of acid produced by the action of bacteria on sugar. It is widely acknowledged that dental caries can be prevented and most often causes chronic infections and is often experienced in childhood. Dental caries is a common disease and has a negative impact on children's quality of life. **Problems:** The high caries in grade IV students of SD Negeri Rangkah 1 Surabaya where in the initial examination the def-t score in SD Negeri Rangkah 1 students was 5.3 which was included in the high severity category. Therefore, to enhance students' knowledge about dental caries, the Smart Dental Box media was created to help convey information about dental caries, with the hope of reducing the high incidence of caries among students at SD Negeri Rangkah 1. **Objective:** To determine the use of Smart Dental Box media in increasing knowledge about dental caries for grade IV students at SD Negeri Rangkah 1 Surabaya. **Methods:** This descriptive research has a total of 32 respondents with pretest and posttest questionnaire sheets. The data analysis technique uses the average of the knowledge results of the pretest and posttest by recapping the data results and presenting them in the form of tables. **Results:** This research can be concluded that the knowledge of grade IV students of SD Negeri Rangkah 1 Surabaya City before counseling using Smart Dental Box media is in the category of sufficient and after counseling using Smart Dental Box media is in the good category.

Keywords: Knowledge about dental caries, grade IV elementary school students, dental caries, Smart Dental Box

INTRODUCTION

The World Health Organization (WHO) defines dental caries as the damage to the tooth enamel caused by acids produced by bacteria that consume sugary foods. It is widely known that one of the persistent challenges in oral health is dental caries. Dental caries is frequently experienced by children and can lead to long-term infections. A common condition that reduces the quality of life for children is dental caries (Shitie et al., 2021).

According to the 2018 RISKESDAS data, the prevalence of dental caries among children aged 5-9 years is 54.0%. This figure is higher than the prevalence of dental caries in adults, which is 45.3%. The WHO target for 2020 was that at least 60%

of children aged 5-6 years should be free of dental caries. The DMF-T index in Indonesia, based on the 2018 RISKESDAS data, for 12-year-old children is 1.9, and only 4% of 12-year-olds have ever visited a dental clinic (Kemenkes RI, 2018).

Based on information obtained from the initial dental health examination at SD Negeri Rangkah 1 in Surabaya on August 28, 2023, the dental caries rate among fourth-grade students at SD Negeri Rangkah 1 showed a def-t index of 5.3. Dental caries in fourth-grade students were measured using the def-t index. When assessing dental health, the def-t index is useful for determining whether primary teeth have cavities or not. In this case, the dental caries among fourth-grade students

at SD Negeri Rangkah 1, with a def-t index of 5.3, falls into the high category, which has a range of 4.5-6.5 (Mitiche & Ayed, 2019).

For elementary school children aged 6 to 12 years, dental health education is crucial as it is a critical time for dental growth and psychological development. This underscores the need for strategies to instill knowledge, attitudes, and healthy behaviors, particularly related to dental health. Media plays an important role in facilitating students' understanding of educational material and supporting the learning process, which is vital for the success of oral health education programs for school-aged children. Messages conveyed through media can be easily understood by students and are more engaging for them (Puspita et al., 2022).

Children need educational media that is enjoyable, not boring, and more effective for them. Learning resources such as Smart Dental Box are also important. It is hoped that the Smart Dental Box platform will become one of the key dental health platforms, including activities and information related to dental caries, which will expand children's understanding (Abral et al., 2020).

For this reason, in this study, Smart Dental Box was used as an educational media. The researchers created a media called Smart Dental Box, which is suitable for children aged 9 to 10 years and serves as an educational tool to enhance awareness about dental caries. The researchers' observation of the limited media and resources available at schools to engage children in maintaining their dental health is one of the reasons for conducting this research.

RESEARCH METHOD

This type of research is descriptive research, which describes knowledge about dental caries before and after the educational intervention using the Smart Dental Box media with fourth-grade students at SD Negeri Rangkah 1

Surabaya. The location of the research is at SD Negeri Rangkah 1 Surabaya, Jalan Kapas Krampung No. 47, Kelurahan Rangkah, Kecamatan Tambaksari, Surabaya City, East Java Province 60135. This study was conducted from August 2023 to February 2024. The target of this study is the fourth-grade students at SDN Rangkah 1 Surabaya, totaling 32 students. The data collection method used in this study is pretest and posttest questionnaires. The data analysis technique involves calculating the average knowledge scores before and after the educational intervention using the Smart Dental Box media. The average results are presented as percentages, then displayed in tables and categorized according to the research criteria according to Nursalam (2017), as follows:

1. Good: 76-100%
2. Enough: 56-75%
3. Less: <56%

RESULT AND DISCUSSION

Table 1. Distribution of Frequency Based on Gender of Fourth-Grade Students at SD Negeri Rangkah 1 Surabaya City in 2023

Gender	Total	Percentage (%)
Male	15	47%
Female	17	53%
Total	32	100%

Table 1 shows that that the majority of respondents in this study are female students, with a percentage of 53%.

Table 2. Distribution of Frequency Based on Age of Fourth-Grade Students at SD Negeri Rangkah 1 Surabaya City in 2023

Age	Total	Percentage (%)
9	10	31%
10	22	69%
Total	32	100%

Table 2 shows that the respondents in this study are predominantly 10 years old, with 22 individuals representing 69%, compared to those who are 9 years old.

Table 3. Distribution of Knowledge about Dental Caries Among Fourth-Grade Students at SD Negeri Rangkah 1 Surabaya City Before the Educational Intervention Using Smart Dental Box Media

Statement	Correct		False		Knowledge Criteria
	N	%	N	%	
Knowledge about dental caries before the educational intervention using Smart Dental Box media	381	59,5	259	40,5	1. Good : 76-100% 2. Enough : 56-75% 3. Less : <56% (Nursalam, 2017)
Average	19,05	59,5	12,95	40,5	Enough

Table 3 shows that before the educational intervention using Smart Dental Box media, the average correct response rate to 20 questions by 32 respondents about knowledge of dental

caries among fourth-grade students at SDN Rangkah 1 Surabaya City was 59.5%, while 40.5% answered incorrectly, placing it in the adequate category.

Table 4. Distribution of Knowledge about Dental Caries Among Fourth-Grade Students at SD Negeri Rangkah 1 Surabaya City After the Educational Intervention Using Smart Dental Box Media

Statement	Correct		False		Knowledge Criteria
	N	%	N	%	
Knowledge about dental caries after the educational intervention using Smart Dental Box media	586	91,6	54	8,4	1. Good : 76-100% 2. Enough : 56-75% 3. Less : <56% (Nursalam, 2017)
Average	29,3	91,6	2,7	8,4	Good

Table 4 shows that after the educational intervention using Smart Dental Box media, the average correct response rate to 20 questions by 32 respondents about knowledge of dental

caries among fourth-grade students at SDN Rangkah 1 Surabaya City was 91.6%, while 8.4% answered incorrectly, placing it in the good category.

Table 5. Distribution of Respondens Answers on Knowledge about Dental Caries Among Fourth-Grade Students at SD Negeri Rangkah 1 Surabaya City Before the Educational Intervention Using Smart Dental Box Media

No.	Statetment	Before			
		Correct		False	
		n	%	n	%
1.	Knowledge about what dental caries means	20	63%	12	38%
2.	Knowledge about the earliest visual signs of dental caries	7	22%	25	78%
3.	Knowledge about bacteria that can cause dental caries	16	50%	16	50%
4.	Knowledge about the consequences of plaque that is not promptly cleaned	18	56%	14	44%
5.	Knowledge about factors that accelerate the occurrence of dental caries	16	50%	16	50%
6.	Knowledge about the causes of dental caries	30	94%	2	6%
7.	Knowledge about one of the consequences of dental caries	14	44%	18	56%
8.	Knowledge about what happens if dental caries is not treated	21	66%	11	34%

promptly					
9.	Knowledge about types of food that are good for maintaining dental health	23	72%	9	28%
10.	Knowledge about what to do if experiencing dental caries	20	63%	12	38%
11.	Knowledge about how often we should have a dental check-up	15	47%	17	53%
12.	Pengetahuan tentang dalam satu hari kita sikat gigi minimal berapa kali	28	88%	4	13%
13.	Knowledge about the minimum number of times we should brush our teeth in a day	23	72%	9	28%
14.	Knowledge about the right time to brush our teeth	16	50%	16	50%
15.	Knowledge about tools that can clean toothbrushes besides the toothbrush itself	21	66%	11	34%
16.	Knowledge about the beneficial ingredients in toothpaste	13	41%	19	59%
17.	Knowledge about the benefits of dental floss	24	75%	8	25%
18.	Knowledge about how to brush the teeth on the side facing the cheek	20	63%	12	38%
19.	Knowledge about how to brush the front teeth on the side facing the lips	22	69%	10	31%
20.	Knowledge about how to brush the teeth on the side facing the tongue	14	44%	18	56%
Total		381		259	
Avarage		19,05	59,5	12,95	40,5

Table 5 shows that the knowledge about dental caries among fourth-grade students at SDN Rangkah 1 Surabaya before the educational intervention using Smart Dental Box media falls into the adequate category with a percentage of 59.5%. Knowledge about the causes of dental caries received the highest correct answer rate at 94%, indicating that the majority of students understand the causes of dental caries. Conversely, knowledge about the earliest visual signs of dental caries received the lowest correct answer rate at 22%, suggesting that a significant portion of students are not yet aware of the initial visual symptoms of dental caries.

Knowledge about the early symptoms of dental caries falls into the inadequate category, having the lowest percentage of correct answers. From this, it can be concluded that the respondents lack knowledge about the early symptoms of dental caries. This study supports the findings of Hidayati et al., (2021) which indicate that students' knowledge about the symptoms of dental caries is still lacking, as many respondents are not yet able to recognize symptoms such as visual signs of

cavities, which are indicators of dental caries.

Knowledge about the definition of dental caries falls into the adequate category. From this information, it can be concluded that the majority of respondents do not yet understand the definition of dental caries, which refers to cavities. This study supports the findings of Mestiyah (2021), which indicate that the level of knowledge among students at SDN Ngagel Rejo 1 Surabaya about the definition of dental caries is categorized as low.

Knowledge about the causes of dental caries falls into the good category, as it has the highest percentage of correct answers. This indicates that the majority of respondents are aware of the causes of dental caries. This finding is consistent with the research by Khoiriyah et al., (2021), which also classified students' knowledge about the causes of dental caries as good.

Based on the explanation above, the research results are consistent with the theory, where most students understand that sweet, soft, and sticky foods, such as chocolate, can cause damage to teeth. However, knowledge about symptoms of

dental caries, such as visual signs that occur when caries develop, is still lacking.

Table 6. Distribution of Respondens Answers on Knowledge about Dental Caries Among Fourth-Grade Students at SD Negeri Rangkah 1 Surabaya City After the Educational Intervention Using Smart Dental Box Media

No.	Statetment	After			
		Correct		False	
		n	%	n	%
1.	Knowledge about what dental caries means	30	94%	2	6%
2.	Knowledge about the earliest visual signs of dental caries	28	88%	4	13%
3.	Knowledge about bacteria that can cause dental caries	29	91%	3	9%
4.	Knowledge about the consequences of plaque that is not promptly cleaned	29	91%	3	9%
5.	Knowledge about factors that accelerate the occurrence of dental caries	23	72%	9	28%
6.	Knowledge about the causes of dental caries	31	97%	1	3%
7.	Knowledge about one of the consequences of dental caries	23	72%	9	28%
8.	Knowledge about what happens if dental caries is not treated promptly	27	84%	5	16%
9.	Knowledge about types of food that are good for maintaining dental health	31	97%	1	3%
10.	Knowledge about what to do if experiencing dental caries	30	94%	2	6%
11.	Knowledge about how often we should have a dental check-up	32	100%	0	0%
12.	Pengetahuan tentang dalam satu hari kita sikat gigi minimal berapa kali	32	100%	0	0%
13.	Knowledge about the minimum number of times we should brush our teeth in a day	31	97%	1	3%
14.	Knowledge about the right time to brush our teeth	30	94%	2	6%
15.	Knowledge about tools that can clean toothbrushes besides the toothbrush itself	31	97%	1	3%
16.	Knowledge about the beneficial ingredients in toothpaste	31	97%	1	3%
17.	Knowledge about the benefits of dental floss	31	97%	1	3%
18.	Knowledge about how to brush the teeth on the side facing the cheek	28	88%	4	13%
19.	Knowledge about how to brush the front teeth on the side facing the lips	27	84%	5	16%
20.	Knowledge about how to brush the teeth on the side facing the tongue	32	100%	0	0%
Total		586		54	
Avarage		29,3	91,6	2,7	8,4

Table 6 shows that knowledge about dental caries among fourth-grade students at SDN Rangkah 1 Surabaya, after the educational intervention using Smart Dental Box media, falls into the good category with a percentage of 91.6%.

Knowledge about the appropriate time for monthly dental check-ups, the correct frequency for brushing teeth in a day, and the method for brushing the teeth on the side facing the tongue received the highest correct answer rate of 100%. Conversely,

knowledge about factors that accelerate the development of dental caries and knowledge about one of the consequences of dental caries had the lowest correct answer rate of 72%. Additionally, there was a significant increase in knowledge about the earliest visual signs of dental caries, rising from 22% to 88%. Knowledge about the causes of dental caries also improved, though not as significantly, from 94% to 97%. This is because, before the intervention using Smart Dental Box media, the majority of students were already aware of the causes of dental caries.

Changes in students' knowledge about dental caries before and after the educational intervention are influenced by the role of the media used. The Smart Dental Box is a type of media made from a cube-shaped cardboard. When the box is opened, images and text related to the subject or theme are displayed on all four sides or layers of the box. The Smart Dental Box can enhance student engagement and help them develop a more comprehensive and memorable understanding. Its unique design distinguishes the Smart Dental Box as an educational tool (Pratiwi & Damayanti, 2019).

This study supports the findings of Humaira et al., (2023), which state that the Smart Dental Box media is effective and suitable for helping students maintain their dental health. With its appealing design and colors, this media can enhance students' interest in learning and capture their attention effectively.

Based on the explanation above, the results of this study align with the S-O-R theory proposed by Skinner as cited in Notoatmodjo (2018). In this context, the use of Smart Dental Box serves as an external stimulus or cue presented to the recipients of the stimulus, or respondents (students). With the Smart Dental Box providing accessible health information about dental caries to fourth-grade students, the students can respond. These responses are classified into two categories: open and closed responses. The closed response is

evident in the increased knowledge about dental caries among fourth-grade students at SDN Rangkah 1 Surabaya after the educational intervention using the Smart Dental Box media.

CONCLUSION AND RECOMMENDATION

Based on the discussion results, it can be concluded that knowledge about dental caries among fourth-grade students at SD Negeri Rangkah 1 Surabaya City before the educational intervention using Smart Dental Box media falls into the adequate category. After the intervention, their knowledge about dental caries falls into the good category.

This study aims to encourage students at SDN Rangkah 1 Surabaya City to regularly maintain their dental and oral health and to inspire parents to adopt caring attitudes and practices for their children's dental health from an early age. It also suggests that health professionals should enhance their outreach by conducting educational sessions on dental and oral health using engaging and educational methods like the Smart Dental Box to better convey information. Additionally, SDN Rangkah 1 is advised to work with health professionals to provide education not just to students but also to their parents on the importance of dental health, particularly concerning dental caries. The school might also consider using the Smart Dental Box as an effective educational tool to further improve students' understanding.

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