



Comparing the efficiency of Animation and Leaflet-Based Dental Health Education on Improving Dental Care Behavior in Children



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ABSTRACT

Aims This study aimed to investigate the impact of dental health education interventions using animation and leaflets on children's dental health behaviors.

Materials & Methods The research employed a quasi-experimental design with pre-test and post-test groups, including a control group in 2021 in Indonesia. A sample of 60 elementary school students, aged 10-12 years, from Medan City, was divided into three groups of 20 students each. The interventions included media animation and leaflets, while the control group received traditional oral presentations. Behavioral changes were evaluated using three parameters of knowledge, attitudes, and actions through a questionnaire. The effectiveness of the interventions was assessed using univariate and covariance analysis.

Findings The behavior scores were highest in the Animation group, with a mean of 52.00±4.54. In contrast, the Oral Presentation group (serving as the control group) had the lowest mean score of 46.90±6.42. The Leaflets group had an intermediate effect, with a mean score of 48.15±5.52. Across all groups, the total mean behavior score was 49.02±5.88.

Conclusion Dental education using animation is the most effective manner in increasing dental care behavior among leaflets and oral presentations.

Keywords Children; Dental Education; Animation; Leaflets; Behavioural Research

CITATION LINKS

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Introduction

Among dental problems, caries and periodontal disease are the most often experienced by people. In Indonesia, as many as 89% of children under the age of 12 suffer from dental and oral diseases [1]. The latest National Health Report shows that dental problems ranked first, 60% of the diseases most suffered by society, and caries reached 88.80% in Indonesia. According to the age, children aged 10-14 years old are prone to caries with 73.4% [2]. This condition will greatly affect the health status, growth and development process, and even the child's future. Among the impacts of dental problems is malnutrition as dental disease reduces their appetite [3, 4]. Another impact is academic performance where their learning ability will decrease, which subsequently affects their learning achievement [5-7]. Poor behavior in dental care has become the main factor in dental issues. In Indonesia, 96.5% of the 10-14-year-old age group brushes their teeth every day but only 2.1% brush their teeth correctly and on time [2]. The behavior of children towards dental care is still low, this is due to the flaw in the dental health knowledge of the children, thus causing the emergence of dental caries [8, 9].

One effort to prevent the occurrence of dental diseases is the need to provide early dental health education for children because dental health education is an essential preventive approach before the occurrence of disease. Dental health education plays a substantial role in children, especially in raising awareness to take care of their teeth for long-term health. The dental health education stance is to change unhealthy behavior consisting of aspects of knowledge, attitudes, and actions toward healthful behavior to achieve a good understanding of dental health [10, 11].

Some health education has been conducted to promote dental health such as by conducting education by using media of audiovisual for 41 deaf children in three days to see the influence [12]. The result shows the effectiveness of audiovisual media in raising knowledge and oral hygiene status ($p=0.0001$). The online media was also used to provide education by oral presentation to 57 high school students [13]. It shows that the media can also increase dental and oral health knowledge problems ($p<0.05$). The oral presentation media has also been performed to provide dental education to elementary students [14]. Students were paying attention to the material presented. However, there is no analysis of the influence after the treatment. There are also interventions by applying technological-based media to educate children about dental health such as the SIMOGI application, an application to educate children by video about dental health, and communication between parents and dental therapists to monitor children's dental health [15]. Besides, the m-Health application [16], smartphone-

based exposure treatment to prevent children from dental phobia resulted in behavioral changes [17]. However, these methods are unreachable to areas/districts to people below the welfare line as it is seen as a costly method, and the cost of creating the application requires more cost. Therefore, dental education at a low cost is still relevant such as using leaflets [18-22] or minimum cost such as creating video animation [23]. Animation media has been considered as educational media to increase knowledge for children. It is seen that the use of animation cartoons can increase dental health knowledge with $p<0.001$ [23]. The method was also performed to see the knowledge changes [24, 25]. The continuum of knowledge-attitude-actions model changes healthful behavior along with the changes in knowledge acquisition, belief generation, and behavior formation [26]. Dental health is an important issue to be discussed since childhood to acquire correct dental health behavior. Improving knowledge and behavior is vital as it is related to subsequent time adolescence and lifetime health [27]. However, little research discussed the effect of distinguished methods of education on behavior.

This research aims to evaluate the effectiveness of media intervention for dental education using leaflets and animation on children aged 10-12 years old towards their behavioral dental care changes.

Materials and Methods

Design

This research was quasi-experimental with pre-test, post-test and a control design. The research was conducted from January to October 2021 in Indonesia.

Population and sample

The study's population consisted of elementary school students in elementary school number 106171 aged 10-12 years, totalling 180 people. The reason for selecting respondents was that students aged 10-12 years have already had all their permanent teeth, and they do not change anymore at the age of 10-12 years. The research sample was all the subjects of participants examined in the study and was acknowledged to represent the population. The sample size calculation used the following formula:

$$n = \frac{N}{1 + N(d^2)}$$

Where "n" is the sample size, "N" is the population, and "d" is precision (error rate), in this case, used 0.15 (15%).

Regarding the sample size calculation, the minimum number of samples was 36 people and the researcher decided to choose a sample size of 60 people who were split into 3 groups. Each group consists of 20 students. This group consisted of a group that was

given intervention in the form of education through animation, and leaflets and a group as control with a conventional method of oral presentation without any media.

The inclusion criteria were: 1) aged between 9 and 12 years, 2) able to read and write, 3) no prior exposure to educational materials delivered through animation or leaflets, and 4) willing to cooperate as participants. The exclusion criteria were: 1) aged between 6 and 8 years, 2) lacking reading and writing skills, and 3) previously exposed to education using animation media or leaflets.

Data collection

Primary and secondary data were employed in this study. The primary data taken by researchers was behavioral data before and after the intervention. Primary data collection was done by filling out a questionnaire regarding dental health care. While the secondary data was obtained from the school. Researchers carried out literature searches and observations and drafted animations about maintaining dental health that were suitable for students. The first step was measuring students' dental health care behavior before intervention, carried out by filling out a questionnaire. The intervention given with animation was that the respondents watched the animation video for 10 minutes. The frequency of watching videos was one time in one week for one month. The intervention using leaflets was done by distributing leaflets once a week for four weeks (one month). After 4 weeks, students' behavior was measured again by distributing questionnaires about maintaining dental health. The materials in the intervention comprised the required equipment for dental care such as the toothbrush, proper toothbrushing steps, the use of dental floss, the correct time to brush the teeth, foods to consume and not, and education of regular control on the dentist.

The questionnaire about dental health knowledge comprised 15 multiple choice questions with the answer choices "correct" being scored 1 and "incorrect" being scored 0, for attitude there were 10 questions using a Likert scale with the answer choices "strongly agree" given a value of 4, "agree" given a value of 3, "disagree" given a value of 2, and "strongly disagree" given a value of 1 and there were 10 questions about action with two categories of 0 and 1. This study underwent validity and reliability testing. All questionnaires passed the validity test, with an r-value greater than the r-table value (0.361). Additionally, the reliability test showed an alpha value exceeding the r-value (0.361), indicating that all the questions are reliable.

Data analysis

The obtained data was analyzed through a data process, including data editing, data entry, and cleaning data. Data analysis was carried out descriptively and analytically. Descriptive results were accomplished by univariate analysis to find out

the description of each variable and covariance analysis to find out the effectiveness of education about maintaining dental health on behavior changes in students using the SPSS Statistic 25 application.

Ethical considerations: This research complied with the ethical feasibility as the part of research activity. The researchers provided the principle of confidential information about the respondents. This research was held after the Research Ethics Commission of Poltekkes Kemenkes Medan No. 01208/KEPK/POLTEKKES KEMENKES MEDAN 2021.

Findings

This study obtained children's knowledge, attitudes, and actions of dental healthcare before and after intervention in the form of education using animation and leaflets compared to the control group.

Table 1. The results of the behavior distribution percentage before and after education

Behavior	Before intervention n (%)	After intervention n (%)
Intervention group using animation		
Knowledge		
Poor	6 (30.0)	2 (10.0)
Fair	12 (60.0)	4 (20.0)
Good	2 (10.0)	14 (70.0)
Attitude		
Poor	6 (30.0)	0 (0.0)
Fair	11 (65.0)	8 (40.0)
Good	3 (15.0)	12 (60.0)
Actions		
Poor	5 (25.0)	0 (0.0)
Good	15 (75.0)	20 (100.0)
Intervention group using leaflets		
Knowledge		
Poor	7 (35.0)	5 (25.0)
Fair	11 (55.0)	8 (40.0)
Good	2 (10.0)	7 (35.0)
Attitude		
Poor	3 (15.0)	1 (5.5)
Fair	14 (70.0)	13 (65.5)
Good	3 (15.0)	6 (30.0)
Actions		
Poor	5 (25.0)	2 (10.0)
Good	15 (75.0)	18 (90.0)
Control group		
Knowledge		
Poor	6 (30.0)	3 (15.0)
Fair	12 (60.0)	12 (60.0)
Good	2 (10.0)	5 (25.0)
Attitude		
Poor	6 (30.0)	4 (20.0)
Fair	10 (50.0)	9 (45.5)
Good	4 (20.0)	7 (35.0)
Actions		
Poor	4 (20.0)	3 (15.0)
Good	16 (80.0)	17 (85.0)

Univariate analysis

There was an increase in knowledge, attitudes, and actions of respondents before and after intervention in the form of education using animation. This increase in knowledge, attitudes, and actions can be seen from the difference in respondents' ability to answer questions correctly before and after

education using animation. Pre-test and post-test scores showed differences (Table 1).

Analysis of Covariance

The study analyzed the impact of three educational methods including Animation, Leaflets, and Oral Presentation on children's dental health care behavior using analysis of covariance (ANCOVA). The assumptions for the ANCOVA test were checked and confirmed.

The behavior scores were highest in the Animation group, with a mean of 52.00 ± 4.54 , indicating that this method was the most effective in enhancing dental care behavior. In contrast, the Oral Presentation group (serving as the control group) had the lowest mean score of 46.90 ± 6.42 . The Leaflets group had an intermediate effect, with a mean score of 48.15 ± 5.52 . Across all groups, the total mean behavior score was 49.02 ± 5.88 .

The ANCOVA results indicated that there was a significant difference in behavior scores across the three methods. The corrected model was statistically significant with an F-value of 17.30 ($p < 0.001$), accounting for 48.1% of the variance in dental health care behavior ($R^2 = 0.481$, Adjusted $R^2 = 0.453$). The Pretest variable also had a significant effect ($F = 36.92$, $p < 0.001$), further influencing the outcome.

Discussion

Dental and oral health are inseparable from their continuum to general health. Therefore, people must be alert toward their dental health. However, little did people know of proper care. In consequence, since childhood, dental problems have become a concern. According to the latest National Health Report 2018, those ages are prone to caries as they have 41.4% caries, 20% lost teeth for extraction, 3% filled teeth, and 13% loose teeth because they lack a proper understanding of maintaining dental health [2]. The cause that may influence the incidence of dental caries is that foods containing carbohydrates, especially sugar, are often found in the snacks consumed by schoolchildren [28, 29].

Knowledge is acquired through the process of sensing a particular object. It was observed that before the intervention, knowledge levels were similar across all groups, with most participants falling into the fair category. The results showed that the average increase in knowledge after education using animation was 2.25, in attitude it was 3.00, and in actions, it was 1.10. This indicates an overall improvement in respondents' knowledge, attitudes, and actions following education with animation, with p-values for knowledge, attitude, and action all being less than 0.05. This means that the use of animation led to significant improvements in knowledge, attitudes, and actions. In conclusion, education through animation proved to be effective in enhancing children's knowledge, attitudes, and actions regarding dental care. The animations

engaged students, making them more attentive to the material presented. The results of this research are in line with Ardhani & Haryati expressing that use of animation can increase the knowledge of proper tooth brushing from 2.8% to 80.6% of students having good knowledge [30]. This is in line with Umniyati *et al.* showing that one of the ways to minimize dental problems is through the preventive methods since childhood, such as using video or audiovisual [31].

Dental education methods by audiovisual media such as cartoon animation have transformed into new attractions. Since its content of images and sound can disseminate information more realistically. Cartoon animation can fascinate kids more than other media due to its friendly symbols. Moreover, it also utilizes the senses of hearing and sight. As it is known that the more senses work, the greater the possibility of understanding the meaning of the information conveyed [32].

This research also revealed that using leaflets also increased the level of knowledge, attitude, and actions. So, education using leaflets was effective in increasing children's knowledge, attitudes, and actions in dental care. The results of this study was approved by Nubatonis & Ayatullah expressing that the promotion of dental and oral health using leaflet media could significantly improve the knowledge and attitudes of elementary school students [33].

Both animation and leaflets improved the behavior of children regarding dental care, effectively. However, the animation was superior to the leaflets. Leaflets deliver health messages or information in the form of sentences and images. Leaflet media is a form of print media that is quite popular and is used for various purposes, including health education. Leaflets can make the respondents learn independently, save time to read repeatedly and share information with others. However, it is not suitable for low education levels or in communities with high levels of illiteracy and is not recommended when it comes to the promotion of healthy lifestyles among healthy children [19].

In the control group, the increase happened in knowledge and attitude but was not effective in increasing actions in dental care.

Delivering educational material using words is less effective or has the lowest intensity and is statistically not significant [34]. Therefore, the preparation of teaching aids or educational media must be understood that knowledge gets through the mind from the five senses [35-37]. These visual aids intentionally mobilize senses as many as possible to make perception easier [38].

It can be seen that among three used educational methods, animation was the most effective because it uses the senses of hearing and sight, followed by leaflets that use visual media and oral presentation that only use the sense of hearing.

Conclusion

Animation demonstrated superior outcomes compared to the leaflet approach and can be considered the most effective method for teaching children about dental health.

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Ethical Permissions: This research complied with the ethical feasibility as the part of research activity. The researchers provided the principle of confidential information about the respondents. This research was held after the Research Ethics Commission of Poltekkes Kemenkes Medan No. 01208/KEPK/POLTEKKES KEMENKES MEDAN 2021.

Conflicts of Interests: Nothing is declared by the authors.

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