THE EFFECTIVENESS OF EDUCATION USING VIRTUAL REALITY VIDEO MEDIA ON ORAL HYGIENE STATUS IN STUDENTS OF STATE ELEMENTARY SCHOOL 10 SUNGAI SAPIH, PADANG CITY

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ABSTRACT

According to the Data and Information Centre of the Ministry of Health of the Republic of Indonesia (2018), the prevalence of caries in Indonesia is 88.8%. The World Health Organisation (WHO) reports that 60-90% of school children worldwide experience caries, with the disease being most prevalent in children aged 6-12 years. Dental caries is a disease that can infect and damage tooth structure. One of the risk factors for caries is plaque accumulation, which is associated with poor oral hygiene. The Personal Hygiene Performance Modified (PHP-M) is a method used to measure plaque on mixed teeth. This research is a quasi-experiment with a one-group pretest-posttest design. The sampling technique used was purposive sampling, with a total of 27 samples meeting the inclusion and exclusion criteria. The study found a significant improvement in oral hygiene status after participants received an educational intervention using virtual reality video media. Specifically, there was a decrease in plaque scores after brushing teeth following the intervention compared to before. The statistical analysis using the Wilcoxon test showed a significant difference with a p-value of less than 0.05. The study found that the number of students with excellent oral hygiene status increased from 15 (40.5%) before the intervention to 36 (97.3%) after the intervention. These results suggest that the use of virtual reality video media is an effective method for improving oral hygiene.

Keywords: Personal Hygiene Performance Modified (PHP-M)., Virtual Reality (VR)., Oral Hygiene.

INTRODUCTION

Oral health problems in Indonesia have been increasing annually, with caries being one of the most significant dental issues. According to the Data and Information Centre of the Ministry of Health of the Republic of Indonesia (2018), the prevalence of dental caries cases in Indonesia is 88.8%[1]. According to the World Health Organization (WHO), dental caries affects 60-90% of children worldwide, particularly those aged 6-12 years in primary school. The Basic Health Research (RISKESDAS) in 2018 found that the prevalence of dental caries in 12-year-olds was 29.8%. Additionally, the Indonesian Dentist Association reports that 89% of those affected by caries are children. Dental caries is a disease that can infect and damage the structure of the teeth[2]. Dental caries is caused by various factors including the host (teeth and saliva), microorganisms, substrate, and time. Predisposing factors of caries include knowledge, attitudes, and behaviour towards maintaining oral health[3].

Additionally, plaque accumulation, which is influenced by predisposing factors, can trigger caries[4].

Caries prevention involves controlling plaque formation on the tooth surface through regular and careful brushing. It is important to develop the habit of brushing teeth in everyday life[4]. Children often neglect their oral health due to limited knowledge about its importance[5].Therefore, health promotion efforts are necessary to reduce the incidence of caries in children. To enhance children's understanding of oral hygiene, education can be provided on the significance of maintaining oral health[5]. This education aims to modify behaviour in terms of knowledge, attitudes, and unhealthy actions towards healthy behaviour, resulting in a better comprehension of oral health. Promotional efforts are required to improve oral hygiene status. These efforts can be made through various media such as posters, hand puppets, flip charts, television, power points, study models and videos.

Several researchers have compared different media used for oral health education. Andriany conducted a study comparing animated cartoon videos and posters as media for educating children about oral health[6]. However, some educational media, such as posters, have weaknesses. Posters are considered weak educational media due to their reliance on visual elements, which require special skills to create, and their content, which requires strong reading skills to understand. Therefore, videos are a more effective educational medium than posters[7].

Technological advancements are rapidly occurring in various fields, including the health sector. Virtual reality (VR) is one such example of technological development. Virtual reality is a computer-generated display of three-dimensional images that immerses users in a simulated environment. It is achieved through the use of specific devices that create a sense of direct involvement, resulting in an experience that closely resembles reality[8].

Virtual Reality (VR) has become increasingly prevalent in the medical field, with applications ranging from surgical training simulations to psychological therapy for conditions such as phobias and stress in cancer patients[9,10]. Additionally, VR is used as a learning tool in medical education to aid in the study and repetition of simulations for simple, difficult, complex, or rare cases[11].

The effectiveness of using virtual reality (VR) in dentistry and oral medicine has not been extensively explored. The study aims to determine the effectiveness of virtual reality video media in improving the oral hygiene status of students at State Elementary School 10 Sungai Sapih, Padang City.

Therefore, researchers aim to investigate the effectiveness of using virtual reality video media for educating students on oral hygiene status at State Elementary School 10 Sungai Sapih, Padang City. The study aims to determine the effectiveness of virtual reality video media in improving the oral hygiene status of students at State Elementary School 10 Sungai Sapih, Padang City. The study aims to determine the effectiveness of virtual reality video media in improving the oral hygiene status of students at State Elementary School 10 Sungai Sapih, Padang City.

MATERIALS AND METHOD

This research utilised a quasi-experimental design, specifically a one-group pretest-posttest design, without a comparison group. An initial test was conducted to determine the magnitude of the effect of the independent variable on the dependent variable. The sample consisted of 37 fifth-grade students from Sungai Sapih State Elementary School in Padang City who met the inclusion and exclusion criteria. The researchers

in this study employed a purposive sampling technique. The study's inclusion criteria require participants to be willing to be sampled, have parents or guardians who are willing to fill out informed consent, and be cooperative during the study. Exclusion criteria include being unable to attend the first or second examination, not being present for the full intervention, having sensitivity to the use of VR or epileptic symptoms, and being toothless. This study examined the change in oral hygiene status among students of State Elementary School 10 Sungai Sapih Padang City after receiving education on how to brush teeth using the horizontal technique through virtual reality video media. The research was approved by the Health Research Ethics Commission of the Faculty of Medicine, Baiturrahmah University, as evidenced by the certificate No. 011/ETIK-FKUNBRAH/03/01/2023.

The study assessed the oral hygiene status of students using the Personal Hygiene Performance-Modified (PHP-M) and examined plaque accumulation on their tooth surfaces with a disclosing agent. Prior to receiving education through Virtual Reality video media, plaque examination was conducted as pre-test data. The PHP-M method uses the following teeth as indices: the upper right rearmost tooth, the upper right canine (permanent/deciduous), the upper left deciduous P1 tooth or first molar, the lower left rearmost tooth, the lower left canine (permanent/deciduous), and the lower right deciduous P1 tooth or first molar. The tooth surface assessed for plaque score is divided into five parts:
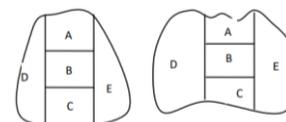

Figure 1. Division of the examined tooth surface

Notes:
A= gingival 1/3 area of the centre area.
B= central 1/3 area of the central area.
C= incisal/occlusal 1/3 area of the centre area.
D= distal area.
E= mesial area.

The assessment sheet assigns a score of 1 to areas with plaque and a score of 0 to areas without plaque. The total plaque score for each tooth is the sum of the plaque scores on each tooth surface, ranging from 0-10. The plaque score for the entire tooth surface index ranges from 0-60. Plaque score categories are grouped as follows: very good (0-15), good (16-30), poor (31-45), and extremely poor (46-60). The data analysis employed in this study used the Wilcoxon test.

RESULTS

The aim of the research was to determine the effectiveness of using Virtual Reality videos on the Oral Hygiene status of 37 students from State Elementary School 10 Sungai Sapih Padang City. The results are presented in the table below, which includes information on class and gender characteristics.

Table 1. Characteristics of Respondents Based on Gender

Gender	*f*	%
Male	18	48.6
Female	19	51.4
Total	37	100

Table 1 shows that 19 respondents (51.4%) were female, while 18 (48.6%) were male. Table 2 indicates that the majority of respondents were 11 years old, with 25 respondents (67.6%).

Tabel 1. Characteristics of Respondents Based on Age

Age	*f*	%
10 years	12	32.4
11 years	25	67.6
Total	37	100

Table 3 illustrates that out of the 37 respondents, 18 students (48.6%) had good PHP-M criteria before the intervention, while 4 students (10.8%) had poor criteria. After the intervention, 36 students (97.3%) had very good PHP-M criteria, and only 1 student (2.7%) had good criteria.

Table 3. Frequency Distribution of Plaque Score after Brushing Before and After Intervention

Plaque Score After Brushing	Before Intervention		After Intervention	
	f	%	*f*	%
Very Good	15	40.5	36	97.3
Good	18	48.6	1	2,7
Poor	4	10.8	-	-
Extremely Poor	-	-	-	-
Total	37	100.0	37	100

This study aimed to evaluate the effectiveness of using Virtual Reality video media in educating students of State Elementary School 10 Sungai Sapih Padang City on Oral Hygiene status. A normality test was conducted using the Kolmogorov-Smirnov test to determine whether the data was normally distributed.

Table 4: Results of Normality Test

Plaque Score After Brushing	df	*p value*
Before Intervention	37	.000
After Intervention	37	.000

Table 4 above shows that the data was not normally distributed as the p-value was less than 0.05. Therefore, a non-parametric statistical method, the Wilcoxon test, was used.

Table 5. Results of Bivariate Analysis with Wilcoxon Test

Wilcoxon test	*p value*
Plaque Score Before and After Tooth Brushing Intervention	.000

The Wilcoxon test results in Table 5 (p = 0.000, 0.000 < 0.05) reject H0 and accept Ha. Therefore, it can be concluded that education using Virtual Reality video media is effective in improving the oral hygiene status of students at State Elementary School 10 Sungai Sapih Padang City.

Figure 2. A student demonstrates how to brush their teeth in the VR video.

DISCUSSION

The study employed Virtual Reality (VR) video media, which is presented through an android-based application and can only be accessed on android-based smartphones with a gyroscope screen. To view the VR video media, virtual glasses are required to hold the smartphone that displays the virtualisation of the video material. To view the VR video media, virtual glasses are required to hold the smartphone that displays the virtualisation of the video material. The video material pertains to proper and correct teeth brushing techniques.

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The research investigated the effectiveness of using Virtual Reality video media in education on Oral Hygiene status in grade 5 students at State Elementary School 10 Sungai Sapih Padang City. The data collected comprised the results of the examination of Oral Hygiene status using the Personal Hygiene Performance Modified (PHP-M) index. The study assessed the impact of Virtual Reality video media on Oral Hygiene status by conducting pre- and post-education examinations.

The examination of the Oral Hygiene status of students at 10 Sungai Sapih Elementary School, Padang City, revealed an improvement after the intervention. The percentage of plaque scores after brushing teeth showed a significant difference before and after the students received education through Virtual Reality video media. After the intervention, the number of students with a 'very good' Oral Hygiene status increased from 15 (40.5%) to 36 (97.3%). These results demonstrate that the use of Virtual Reality video media for education has improved students' Oral Hygiene status, as evidenced by a decrease in the PHP-M index score. According to Ramesh Kumar's research in 2016, a smaller plaque index value indicates better oral hygiene and cleanliness of the teeth and mouth[13].

The study found that using horizontal toothbrushing techniques can reduce plaque scores. Research suggests that brushing teeth with the horizontal method can reduce the plaque index more effectively than the roll method. Research suggests that brushing teeth with the horizontal method can reduce the plaque index more effectively than the roll method. This is due to several factors, including the ability of each child to brush their teeth differently and the pressure applied during tooth brushing. Research suggests that brushing teeth with the horizontal method can reduce the plaque index more effectively than the roll method. Astannudinsyah's study (2019) also found that implementing the roll method is more challenging than the horizontal method[14].

The use of video media in education can aid children's comprehension of presented material. This is supported by Kantohe's (2016) research, which compared the effectiveness of dental health education using video and flip chart media to increase children's dental and oral health knowledge. Video media has been shown to enhance students' understanding of the material both before and after reading[15].

The use of Virtual Reality (VR) in education can improve children's understanding and memory retention. By incorporating visual and audio elements, VR can be an effective tool for learning. Research by Dharma et al. (2018) supports this, stating that VR is easy to use, provides better visual information, is engaging, and enhances comprehension. Pratiwi in Dharma et al. (2018) suggests that memory is closely linked to a child's experiences and their surroundings[16].

CONCLUSION AND SUGGESTION

The study analysis indicates a significant difference in the Oral Hygiene status of students at State Elementary School 10 Sungai Sapih, Padang City before and after education using Virtual Reality video media on brushing their teeth. Based on the research results, the Health Service, Community Health Centers, and Education Department are recommended to use Virtual Reality (VR) as an alternative educational medium for elementary school children. Further research on the use of VR in dentistry with different subjects and materials is also suggested.

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