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Original Research Article

The Effectiveness of Dental Health Promotion Using Audiovisual and Leaflet Media Improving the Dental Hygiene Status of Elementary School Students in Pidie District, Aceh

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Abstract: Elementary school students are a group with a high risk of dental caries, so their selection as a target for health promotion is very appropriate. This research aims to develop accessible, cheap, and effective health promotion media. Health promotion media developed are audiovisual and leaflets. The research method is a quasi-experimental (quasi- experimental) design with a pre-test – post-test group design. The population in this study was all students of Beureunun State Elementary School I and all of Beureunun State Elementary School 3, Pidie Regency. The sample in the study amounted to 100 students. Data analysis used univariate and bivariate. The study's results found a difference in the mean knowledge score in post-test I and post-test II between the audiovisual media group and the leaflet media group. The audiovisual media group was higher than the leaflet statistically at the significance level of p = 0.000. In the attitude aspect, there is a difference in the mean attitude score in post-test I and post-test II; audiovisual media showed an increase in the mean score of attitudes which was higher than the leaflet group, which was proven statistically at a significant level of p = 0.000. There is a difference in the mean behavioral score in post-test I and post-test II between the audiovisual media group and the leaflet media group, the mean behavior score in the audiovisual media group are higher than the leaflet at a significance level of p = 0.000.

Keywords: Dental Health Promotion, Leaflet Media, Dental Hygiene Status.

INTRODUCTION

Based on The Global Burden of Disease Study 2016, dental caries is a disease experienced by almost half of the world's population (3.58 billion people) [1]. The results of the 2018 Basic Health Research (Riskesdas) stated that the most significant proportion of dental problems in Indonesia was damaged/cavities/sick teeth (45.3%) [2]. Meanwhile, the majority of oral health problems experienced by the Indonesian population are swollen gums and ulcers (abscesses) by 14%. As many as 57.6% of the Indonesian population experience dental and oral problems, and only about 10.2% have received medical services [2]. Early childhood is the most dominant group with dental health problems. Currently, the prevalence of cavities in early childhood is very high (93%), and only 7% of children are free from cavities. It is necessary to start taking preventive measures early for elementary school students. Students' dental and oral health problems require comprehensive medical care and treatment. However, the COVID-19 pandemic also impacts the disruption of public access to health services.

One of the efforts to promote dental health in students can use the media [3]. Health promotion media regarding dental health suitable for elementary school students are still relatively limited in number, so currently, the right media is needed to convey information about rabies that is under the needs of elementary school students. The limited health promotion media for elementary school students is due to the limited facilities and infrastructure for health promotion in schools, so it is necessary to develop health promotion methods that are suitable for the needs of elementary school students [4].

One of the reasons for the development of new methods in health promotion is to improve the existing methods for the better; delivery of new information based on instructions [5]. The old methods used in

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health promotion for elementary school students are games in the form of snakes and ladders and card games. Method development is also carried out in the context of implementing instructions by institutions interested in improving public health, such as ministries and related agencies on health. Health promotion media for elementary school students differs from the media commonly used for adults [6].

Health promotion media for elementary school students must be based on cognitive, motoric, and socio-cultural developments that are different from adults in general [7]. Differences can be in the delivery or the selection of media used. The way of delivering health promotion to children generally uses simple language and interesting tools so that it is easily understood by students who are the object of health promotion [8]. The proper media selection is very influential on the success of health promotion. Games are one method that is quite effective in health promotion used in children [9].

The Acehnese population is aged ten years and over who brush their teeth every day is: 87.6% of the population, but those who brush their teeth properly (after breakfast and before going to bed at night) are only 4.9% of the population, and those who brush their teeth incorrectly are 95, 1%1a. The results of a preliminary examination of dental and oral hygiene conducted by researchers using the PHP-M (Personal Hygiene Performance-Modified) method on 40 fifth-grade students of Beureunun State Elementary School I and 3 Beureunun Elementary School, Pidie Regency, obtained as many as six students (15%) with good dental and oral hygiene criteria, 27 students (67.5%) with moderate criteria, and seven students (17.5%) with poor dental hygiene criteria. Cases of dental and oral hygiene often occur in elementary school-age children, so elementary school students have a considerable risk of tooth decay from an early age. Prevention in elementary school students can be done by health promotion. Therefore, this study aims to develop an easy, inexpensive, and effective health promotion method to increase elementary school students' knowledge about dental health.

METHODOLOGY

This type of research is a quasi-experimental (quasi-experimental) design with a pre-test – post-test group design. The population in this study was all students of Beureunun State Elementary School I and all of Beureunun State Elementary School 3, Pidie Regency. The sample in this study was all fifth-grade students aged 10-12 years. Beureunun State Elementary School I and 5th-grade students aged 10-12 years old Public Elementary School 3 Beureunun, Pidie District. The sample in the study amounted to 100 people who were divided into two groups, each treatment group I (dental health education intervention through audiovisual media) and treatment group II (dental health education intervention through leaflets).

Data were collected utilizing a questionnaire. The questionnaire was used to measure students' knowledge, attitudes, and behavior about dental health maintenance. Data analysis in this study was done by editing, coding, scoring, tabulating, and entering) and then analyzed statistically. Data processing using independent t-test paired sample t-test, and comparing the mean results of pre-test with post-test in the two intervention groups, the decision to test the research hypothesis is based on a significant level of 0.05

RESULTS

Univariate Analysis

Univariate analysis or descriptive analysis in this study included: knowledge data description, attitude data, behavior data, and dental and oral hygiene data, both before treatment (pre-test) and after treatment (post-test I and post- test II).

Source of Information before Treatment

Data about the sources of information in this study were collected through measuring instruments in the form of student statements, totaling four. The distribution of data about the complete information source is described in the following table.

Table 1: Distribution of students by means and sources of information about dental health before treatment in treatment group I (audiovisual media) and treatment group II (leaflet media)

Resources	Group				Total	
	Treatment I		Treatment II			
	n	%	n	%	n	%
Information Facilities owned						
Television	12	24	8	16	20	20
Radio	16	32	23	46	39	39
Television & Radio	20	40	17	34	37	37
There is not any	2	4	2	4	4	4
Total	**50**	**100**	**50**	**100**	**100**	**100**
Chi-Square (χ^2) = 2,300 p= 0,513						
Information about Dental Health: Television Once						

Never	3 47	6 94	2 48	4 96	5 95	5 95
	50	100	50	100	100	100
Chi-Square (χ^2) = 0,211 p= 0,646						
Radio Once Never	1 49	 2 98	 2 48	 4 96	 3 97	 3 97
	50	100	50	100	100	100
Chi-Square (χ^2) = 0,344 p= 0,558						

The distribution of information facilities and sources in table 2 shows that most students already have information facilities, and only four students (4%) of all respondents (audiovisual media group and leaflets) do not have information facilities (Television and Radio) every two people at a time. Audiovisual media group and two people in the leaflet group. Regarding whether or not students have received information about dental health from television or radio, more than 90% of respondents from all respondents (audiovisual media and leaflet groups) said that they never had.

Knowledge of Dental and Oral Hygiene

The distribution of knowledge data about dental and oral hygiene in each group can be seen in the following table.

Table 2: Distribution of students based on knowledge of dental and oral hygiene at the pre-test, post-test I, and post-test II stages

Knowledge of Dental and Oral Hygiene	Group Frequency Distribution:				Total	
	Treatment I		Treatment II			
	N	%	n	%	n	%
Pre-Test						
Less (0 - 25)	14	28,0	12	24,0	26	26,0
Enough (26 - 50)	36	72,0	35	70,0	71	71,0
Good (51 - 75)	0	0,0	3	6,0	3	3,0
Very Good (76 - 100)	0	0,0	0	0,0	0	0,0
Post-Test I						
Less (0 - 25)	0	0,0	0	0,0	0	0,0
Enough (26 - 50)	4	8,0	20	40,0	24	24,0
Good (51 - 75)	19	38,0	28	56,0	47	47,0
Very Good (76 - 100)	27	54,0	2	4,0	29	29,0
Post-Test II						
Less (0 - 25)	0	0,0	0	0,0	0	0,0
Enough (26 - 50)	0	0,0	13	26,0	13	13,0
Good (51 - 75)	15	30,0	27	54,0	42	42,0
Very Good (76 - 100)	35	70,0	10	20,0	45	45,0

The distribution of students' knowledge before treatment (pre-test) in the Treatment group I the majority were in the sufficient category (72.0%); as well as in the Treatment group II (70.0%). Knowledge data in post-test I, in the Treatment group I the majority was in the very good category (54.0%); while in the treatment group II the majority were in the good category (56.0%). Knowledge data in post-test II, the majority in the Treatment group I was in the very good category (70.0%) while in the Treatment group II the majority was in the good category (54.0%).

Attitude towards Dental and Oral Hygiene

The frequency distribution of attitudes towards dental and oral hygiene in each group can be seen in the following table.

Table 3: Distribution of students based on attitudes towards dental and oral hygiene at the pre-test, post-test I, and post-test II stages

Attitude	Group				Total	
	Treatment I		Treatment II			
	N	%	n	%	n	%
Pre-Test						
Less (17-29)	1	2,0	1	2,0	2	2,0
Enough (30-42)	44	88,0	44	88,0	88	88,0
Good (43-55)	5	10,0	5	10,0	10	10,0
Very Good (56-68)	0	0,0	0	0,0	0	0,0

Post-Test I						
Less (17-29)	0	0,0	0	0,0	0	0,0
Enough (30-42)	0	0,0	5	10,0	5	5,0
Good (43-55)	44	88,0	45	90,0	89	89,0
Very Good (56-68**)**	6	12,0	0	0,0	6	6,0
Post-Test II						
Less (17-29)	0	0,0	0	0,0	0	0,0
Enough (30-42)	0	0,0	1	2,0	1	1,0
Good (43-55)	21	42,0	39	78,0	60	60,0
Very Good (56-68)	29	58,0	10	20,0	39	39,0

Table 4 describes the attitude of students before treatment (pre-test) in Treatment group I was a majority in the excellent category (88.0%) as well as in the Treatment group II (88.0%). Analysis of the post-test data showed that the majority in Treatment group I were in a suitable category (88.0%) and in Treatment group II (90.0%).

Behavior towards Dental and Oral Hygiene

The distribution of attitude scores towards dental and oral hygiene in each group can be seen in the following table.

Table 4: Distribution of students based on behavior towards dental and oral hygiene at the pre-test, post-test I, and post-test II stages

Attitude	**Group**				**Total**	
	Treatment I		**Treatment II**			
	N	**%**	**n**	**%**	**n**	**%**
Pre-Test						
Less (16-27)	1	2,0	1	1,0	2	2,0
Enough (28-39)	41	82,0	38	76,0	79	79,0
Good (40-52)	8	16,0	11	22,0	19	19,0
Very Good (53-64)	0	0,0	0	0,0	0	0,0
Post-Test I						
Less (16-27)	0	0,0	0	0,0	0	0,0
Enough (28-39)	5	10,0	11	22,0	16	16,0
Good (40-52)	44	88,0	39	78,0	83	83,0
Very Good (53-64)	1	2,0	0	0,0	1	1,0
Post-Test II						
Less (16-27)	0	0,0	0	0,0	0	0,0
Enough (28-39)	0	0,0	0	0,0	0	0,0
Good (40-52)	19	38,0	38	76,0	57	57,0
Very Good (53-64)	31	62,0	12	24,0	43	43,0

Table 4 describes the behavior before treatment (pre-test) in treatment group I. The majority were in a suitable category (82.0%) and the treatment group II (76.0%). The results of the analysis of post-test data I showed that in treatment group I, the majority were in a suitable category (88.0%) and treatment group II (78.0%). As for the post-test data II, the majority of the treatment group I was in an outstanding category (62.0%), while in the second treatment group, the majority was in a suitable category (76.0%).

Dental and Oral Hygiene

The results of dental and oral hygiene examinations, measured by dental plaque scores (PHP-M) before and after treatment in each group, can be seen in the following table.

Table 5: Distribution of students based on dental plaque scores at the pre-test, post-test I, and post-test II stages

Dental and Oral Hygiene	**Group**				**Total**	
	Treatment I		**Treatment II**			
	N	**%**	**n**	**%**	**N**	**%**
Pre-Test						
Very Bad (46-60)	29	58,0	27	54,0	56	56,0
Bad (31-45)	21	42,0	22	44,0	43	43,0
Good (16-30)	0	0,0	1	2,0	1	1,0
Very Good (0-15)	0	0,0	0	0,0	0	0,0
Post-Test I						
Very Bad (46-60)	1	2,0	4	8,0	5	5,0

Bad (31-45)	22	44,0	31	62,0	53	33,0
Good (16-30)	25	50,0	15	30,0	40	40,0
Very Good (0-15)	2	4,0	0	0,0	2	2,0
Post-Test II						
Very Bad (46-60)	0	0,0	3	6,0	3	3,0
Bad (31-45)	6	12,0	27	54,0	33	33,0
Good (16-30)	38	76,0	20	40,0	58	58,0
Very Good (0-15)	6	12,0	0	0,0	6	6,0

The distribution of dental plaque scores showed that before treatment, the majority of treatment group I was terrible (58.0%) and treatment group II (54.0%). After the intervention (treatment) and post-test, I was carried out, the majority of the treatment group was in a suitable category (50.0%), while in the second treatment group, the majority was in the wrong category (62.0%). The results of post-test II in the majority of treatment group I were in the excellent category (76.0%), and the majority of the experimental group I was in the wrong category (54.0%).

Bivariate Analysis

A bivariate analysis in this study was used to test the hypotheses in this study, namely: (1) dental health education using audiovisual media was more effective in increasing students' knowledge, attitudes, and behavior compared to using leaflet media. (2) Dental health education using audiovisual media is more effective in improving students' dental and oral hygiene status than leaflet media.

Analysis of Differences in Observations (Paired Sample t-test)

1) Average Knowledge Score Difference

The mean difference from pre-test to post-test I, post-test I to post-test II, and pre-test to post-test II students' knowledge of dental and oral hygiene in treatment group I (audiovisual media) and treatment group II (media leaflet) is presented in the following table:

Table 6: The average difference and standard deviation of students' knowledge about dental and oral hygiene in experimental group I (audiovisual media) and experimental group II (leaflet media)

Tested Data	Treatment I			Treatment II		
	Average Difference ± SD	Account	p	Average Difference ± SD	t-count	P
Pre-test to *Post-test* I	42.86 ± 10.3	29,4	0,000*	21,72±11,63	13,20	0,000*
Post-test I to *Post-test* II	6,29 ± 5,52	8,05	0,000*	7,00±6,04	8,20	0,000*
Pre-test to *Post-test* II	49,14 ± 10,27	33,836	0,000*	28,72 ± 12,12	16,76	0,000*

Note: * = significance

The average difference in knowledge in the two treatment groups in table 6 shows a significant difference in the increase in knowledge in the two treatment groups; the difference is statistically significant at the significant level of p <0.05. Treatment group I is better than treatment group II. This is proven by the results of the statistical analysis of pre-test to post-test II; the mean value of knowledge in treatment group I was higher (49.14) than the treatment group II (28.72).

1**) Average Difference in Attitude Score**

The mean difference from pre-test to post-test I, post-test I to post-test II and pre-test to post-test II students' attitudes towards dental and oral hygiene in treatment group I (audiovisual media) and treatment group II (media leaflet) is presented in the following table:

Table 7: The mean difference and standard deviation of students' attitudes about dental and oral hygiene in treatment group I (audiovisual media) and treatment group II (leaflet media)

Tested Data	Treatment I			Treatment II		
	Average Difference ± SD	Account	p	Average Difference ± SD	Account	P
Pre-test to *Post-test* I	13,54 ± 4,86	19,69	0,000*	10,52 ± 4,10	18,11	0,000*
Post-test I to *Post-test* II	6,58 ± 1,90	24,54	0,000*	5,42 ± 1,78	21,48	0,000*
Pre-test to *Post-test* II	20,12 ± 5,08	28,02	0,000*	15,94 ± 4,16	27,08	0,000*

Note: * = significance

Table 7 describes a significant difference in attitude improvement in the two treatment groups, which is statistically significant at the significant level of p<0.05. I was better than treatment group II when viewed as a group treatment group. This is proven by the results of the statistical analysis of pre-test to post-

test II, where the mean attitude value of treatment group I was higher (20.12) than treatment group II (15.94).

Average Behavioral Score Difference

The mean difference from pre-test to post-test I, post-test I to post-test II, and pre-test to post-test II student behavior towards dental and oral hygiene in treatment group I (audiovisual media) and treatment group II (media leaflet), is presented in the following table:

Table 8: The mean difference and standard deviation of student behavior regarding dental and oral hygiene in treatment group I (audiovisual media) and treatment group II (leaflet media)

Tested Data	Treatment I			Treatment II		
	Average Difference ± SD	Account	p	Average Difference ± SD	t_h	P
Pre-test to *Post-test* I	9,56 ± 4,38	15,43	0,000*	6,70 ± 3,45	13,72	0,000*
Post-test I to *Post-test* II	8,76 ± 3,43	18,05	0,000*	7,94 ± 2,87	19,53	0,000*
Pre-test to *Post-test* II	18,32 ± 4,49	28,83	0,000*	14,64 ± 4,52	22,92	0,000*

Description: * = significant

The analysis results in table 8 show a significant difference in behavior improvement in the two treatment groups; the difference is statistically significant at the significant level of p<0.05. I was better than treatment group II when viewed as a group treatment group. This is proven by the results of the statistical analysis of pre-test to post-test II; the mean value of behavior in treatment group I was higher (18.32) than the treatment group II.

Average Difference in Dental and Oral Hygiene Score

The mean difference from pre-test to post-test I, post-test I to post-test II, and pre-test to post-test II of students' oral hygiene in treatment group I (audiovisual media) and treatment group II (leaflet media) is presented in the following table.

Table 9: The mean difference and standard deviation of students' dental plaque scores on dental and oral hygiene in treatment group I (audiovisual media) and treatment group II (leaflet media)

Tested Data	Treatment I			Treatment II		
	Average Difference ± SD	Account	P	Average Difference ± SD	Account	P
Pre-test to *Post-test* I	17,74 ± 5,84	21,46	0,000*	10,42 ± 4,70	15,66	0,000*
Post-test I to *Post-test* II	5,64 ± 3,64	10,95	0,000*	2,90 ± 3,24	6,32	0,000*
Pre-test to *Post-test* II	23,38 ± 6,91	23,94	0,000*	13,32 ± 5,42	17,37	0,000*

Keterangan: * = signifikan

The mean difference in dental plaque scores in table 9 shows a significant difference in the decrease in dental plaque scores in the two treatment groups (audiovisual media and leaflet media), which is a statistically significant difference with p <0.05. Judging from the mean pre-test to post-test II, the mean difference in group I (students who were treated using audiovisual media) was higher (23.38) compared to the average difference in group II (students who were treated using leaflet media).

DISCUSSION

The results showed a difference in the average knowledge score in the post-test I and post-test II between the audiovisual media group and the leaflet media group, where the average knowledge score in the audiovisual media group was higher than the leaflet group. The difference was statistically significant at the significance level of p = 0.000. Changes in the increase in the value of higher knowledge in the audiovisual group in this study occurred because respondents were invited to use all their senses to study and understand dental health material through films with quick and concrete messages, through the appearance of different images so that they did not cause boredom, interesting so that cause stimulation. In several other studies, leaflets tended to make students inactive in studying dental health problems during counseling [10-12].

The results showed a difference in the mean attitude scores in the post-test I and post-test II between the audiovisual media group and the leaflet media group, where the audiovisual media group showed a higher average attitude score increase compared to the leaflet group. Statistically, the difference was significant at the significance level of p = 0.000. These results prove that dental health education interventions through audiovisual media are more effective than leaflets in improving students' attitudes about dental and oral hygiene. The increase in the mean value of attitudes in this study indicated an increase in student confidence in the importance of maintaining oral and dental hygiene [13, 14].

The high increase in students' confidence in what is valid or considered correct about dental and oral hygiene maintenance is influenced by increased knowledge gained through dental and oral health education. There is a difference in the average behavioral score in post-test I and post-test II between the audiovisual media group and the leaflet media group, the average behavior score in the audiovisual media group are higher than the leaflet group. The difference was statistically significant at the significance level of p = 0.000. Dental health education interventions through audiovisual media are more effective than leaflets in improving student behavior in maintaining dental and oral hygiene.

Audiovisual media can cause several changes, such as changes in behavior, increasing knowledge, influencing the respondent's stage of surviving information or material, strengthening values, and influencing psychological perspectives so that they can construct respondents' hearing to form their views of social reality where respondents interact with symbols offered by the media [15-17]. This study's results showed a difference in the mean dental plaque score in the post-test I and post-test II between the audiovisual media group and the leaflet media group, the mean dental plaque score in the audiovisual media group were lower than the leaflet group. The difference was statistically significant at the significance level of p = 0.000. Dental health education interventions through audiovisual media are more effective than leaflets in reducing students' dental plaque scores. The analysis of the difference in repeated observations (paired sample t-test) in the two groups showed a difference in the mean difference in the reduction in dental plaque scores (pre-test to post-test I, post-test I to Post-test II, pre-test to post-test II). Between experimental group I and experiment II, this difference was statistically significant (p = 0.000), and the average difference in treatment group I (students who were treated using audiovisuals) was higher in decline than the mean of group II (students who were treated using leaflets).

The results of testing the characteristics of research respondents based on age and gender showed no statistically significant difference (p>0.05). The measurement of respondents' initial knowledge based on information sources (television and radio) is still very lacking. Thus the sources of information about dental and oral hygiene obtained from the previous mass media are still very minimal. The level of knowledge of respondents who participate in health promotion highly depends on the amount and quality of the information received. The quality of information relates to how the information provided is produced and the effectiveness of the information to the respondent. Information produced with good planning and received by respondents impacts a higher level of knowledge. It provides more extended memory for elementary school students participating in health promotion counseling with audiovisual tend to be more effective in increasing students' knowledge of brushing teeth compared to leaflets. It is recommended for health workers to use audiovisual in outreach activities targeting elementary school students.

CONCLUSION

Dental health education using audiovisual media effectively improves students' dental and oral hygiene status in Pidie District. Through audiovisual media and leaflets, dental health education can significantly increase students' knowledge, attitudes, and behavior towards dental and oral hygiene. Dental health education using audiovisual media increases students' knowledge, attitudes, and behavior more effectively than oral leaflet media for elementary school students in Pidie District.

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