**Research article**                                   **Medical research**

# Dental health education media in the form of android-based monopoly game

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## ABSTRACT

### Introduction

Oral and dental health problems can be prevented through dental health education in which methods and media play an important role. Media that is often used in schools is still conventional. So that it needs research on game-based media use.

### Aims

To analyze the effectiveness of monopoly game as an android-based dental health education media.

### Methods

Non-randomized control group Quasi-experimental pre-test and post-test design. Samples totaling 120 students (4 elementary schools) were taken using total sampling technique. The research instrument used was a questionnaire to evaluate the feasibility of the media and questionnaires to obtain the value of dental health knowledge and attitudes analyzed through Wilcoxon and Mann-Whitney tests.

### Results

The p-value value of the comparative test of 2 groups in pairs on the knowledge and attitude of dental health in the intervention and control groups was 0.001. The p-value of the comparative test of 2 unpaired groups on dental health knowledge and attitudes between the intervention and control groups was 0.001.

### Conclusion

The application of monopoly game is more effective than leaflets in improving knowledge, dental health attitudes and need further research to test the effectiveness with more sample sizes.

**Keywords:** Dental health education, Educational game, Interactive multimedia, Monopoly dental health game.

## INTRODUCTION

Oral and dental health even though it does not lead to death but can reduce work productivity, even affect the quality of life. [1, 2] teeth with a mean of 3.86 days. [3] Survey data show that the DMF-T rate in Indonesia is in the high category when compared to the WHO target that the average

DMF-T Index is less than, 1.[4.5] The factors that influence dental health problems and the mouth is hereditary, environmental, behavioral, and dental health services. [6] The emergence of dental and oral health problems in the community is a low level of maintenance of dental and oral hygiene. [6] Knowledge, attitudes and actions are factors that influence a person's awareness in maintaining

dental and oral health. This is in line with Nurfalah's (2014) opinion which states that there is a significant relationship between the level of dental and oral health knowledge with the incidence of dental caries. [7]

Increased knowledge, attitudes and skills to maintain dental and oral hygiene can be done through dental health education which is a type of health promotion behavior approach that requires an educational process. The achievement of a process of dental and oral health education is shown by better behavioral changes which involve changes, knowledge (cognitive), skills (psychomotor), as well as those relating to the attitudes and behavior of dental and oral health (affective). This is in accordance with Hamalik's perspective (1990) which says that the results of learning activities are behavioral changes in the form of affective, cognitive, and psychomotor aspects. The education process is a function of several factors, among others, educators, students, environment, educational methods, and learning media. [8]

Media is one of the factors that can influence the process of health education, because it is a tool to facilitate the delivery of material, as well as dental and oral health education media as learning aids that must be well-packaged, interesting and involve many senses to make it easier to remember. The effectiveness and efficiency of the dental and oral health education process is influenced by the appropriateness and suitability of the use of methods and learning media, because the media utilized not only provides information, but must also provide experience. [9] Involving more senses will be more easily accepted and remembered by education targets. [10] The educational process that involves the senses is the process of education that uses the media in the form of game. One interesting game that is typically used as an educational medium is a monopoly. Monopoly is a board game with players competing to accumulate wealth through the rules of the game. [11]

## METHODS

The study was undertaken in May 2018 in 4 elementary schools, using a quasi-experimental non-randomized control group pretest and post-test design (non equivalent control group) which divided the group into two, namely the intervention group and the control group. SDN Banyumanik 02 and 04 as the intervention group and SD N Banyumanik 01 and 03 as the control group taken through total sampling. The intervention group and controls were provided with dental health education using the Android-based dental health monopoly application and 6 time leaflets. Research variables are dental health knowledge and attitudes measured by a questionnaire. The data obtained will be analyzed using a comparative test of 2 groups paired with unpaired

## RESULT

The number of respondents in the study amounted to 120 students consisting of 60 men and women.

**Table 1. Frequency Distribution of Dental Health Knowledge Value Intervention and Control Groups**

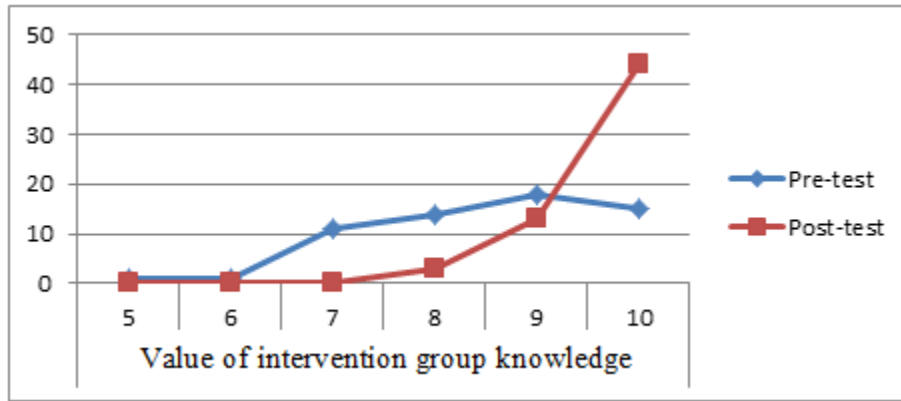| Statistic | Knowledge Value | | | |
| --- | --- | --- | --- | --- |
| | **Intervention Group** | | **Control Group** | |
| | *Pre-test* | *Post-test* | *Pre-test* | *Post-test* |
| N | 60 | 60 | 60 | 60 |
| Mean | 8,53 | 9,68 | 8,13 | 8,70 |
| Std. D | 1,200 | 0,567 | 1,432 | 1,225 |
| Minimum | 5 | 8 | 4 | 6 |
| Maximum | 10 | 10 | 10 | 10 |

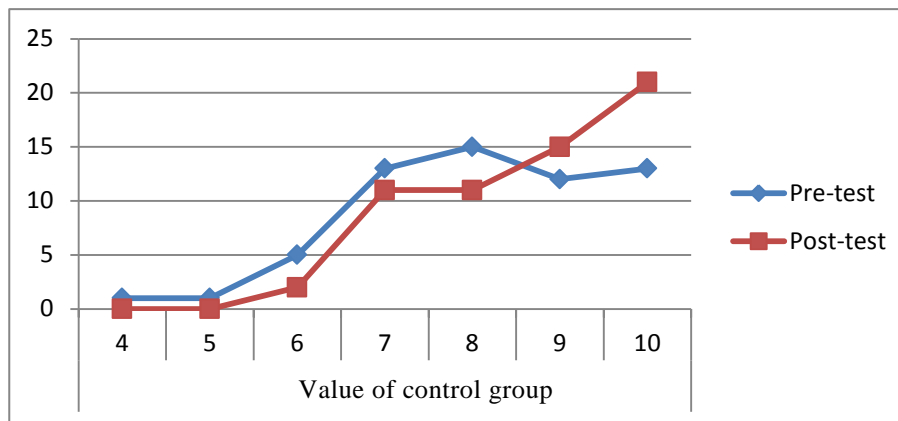**Figure 1. Graph of knowledge of intervention groups**



**Figure 2. Graph of knowledge of control groups**

**Table 2. Frequency Distribution of Attitudes of Dental Health Attitudes Intervention and Control Groups**

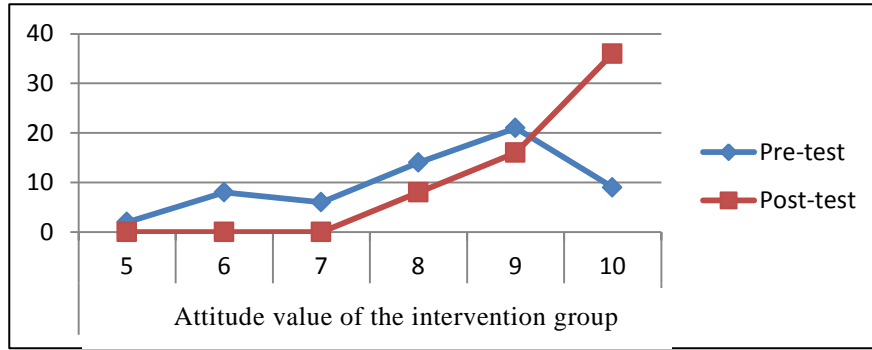| Statistic | Attitude Value | | | |
| --- | --- | --- | --- | --- |
| | **Intervention Group** | | **Control Group** | |
| | *Pre-test* | *Post-test* | *Pre-test* | *Post-test* |
| N | 60 | 60 | 60 | 60 |
| Mean | 8,18 | 9,47 | 7,85 | 8,43 |
| Std. D | 1,372 | 0,724 | 1,603 | 1,307 |
| Minimum | 5 | 8 | 4 | 6 |
| Maximum | 10 | 10 | 10 | 10 |

**Figure 3. Graph of the value of the attitude of the intervention group**
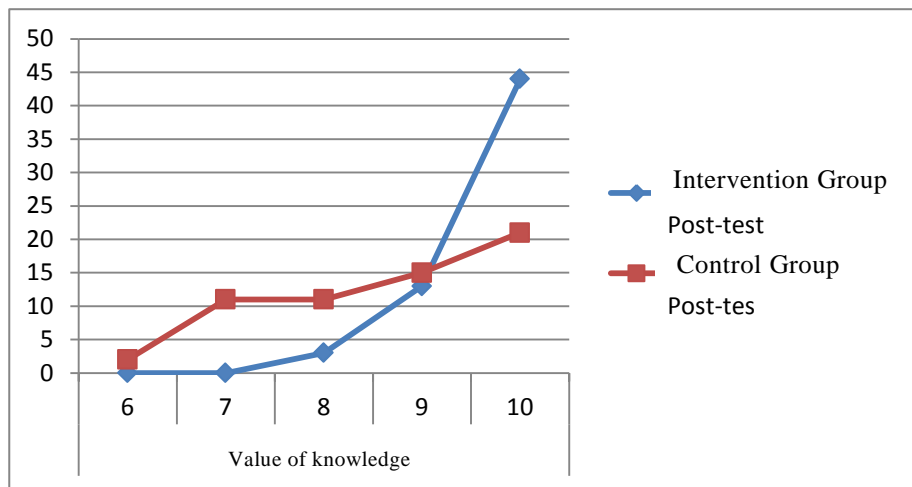


**Figure 4. Comparison graph of knowledge value of intervention group with control**



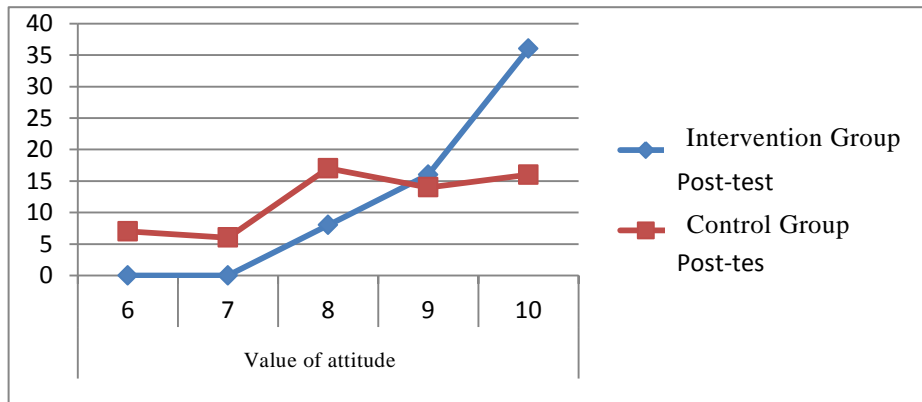**Figure 5. Reverse graph of attitude of intervention group with control**

**Table 3. Data Normality Test for Dental Health Value Knowledge**

| Value        of | Intervention Group | | Control Group | |
|-----------------|----------|-----------|----------|----------|
| Knowledge | Pre-test | Post-test | Pre-test | Post-tes |
| N | 60 | 60 | 60 | 60 |
| Statistic | 0,201 | 0,445 | 0,144 | 0,206 |

| p-value | 0,000 | 0,000 | 0,003 | 0,858 |
|---------|-------|-------|-------|-------|

*Kolmogorov-smirnov

**Table 4. Normality Test of Dental Health Attitude Value Data on Main Field Test**

| Value | Intervention Group | | Control Group | |
|-------|----------|-----------|----------|-----------|
| Attitude | Pre-test | Post-test | Pre-test | Post-tes |
| N | 60 | 60 | 60 | 60 |
| Statistik | 0,224 | 0,369 | 0,163 | 0,168 |
| *P-value* | 0,000 | 0,000 | 0,000 | 0,000 |

*Kolmogorov-smirnov

**Table 5. Test the Normality of Data Transform the Value of Knowledge and Attitudes of Dental Health**

| Data Transform | | Statistic | N | *p-value.* |
|----------------|-----------|-----------|-----|------------|
| Pre-tes | Knowledge | 0,184 | 120 | 0,000 |
| | Attitude | 0,193 | 120 | 0,000 |
| Post-test | Knowledge | 0,307 | 120 | 0,000 |
| | Attitude | 0,234 | 120 | 0,000 |

*Kolmogorov-smirnov

**Table 6. Difference in Knowledge and Attitudes of Dental Health**

| Value of post-test – pre-test | Group | N | Mean Rank±Sum of Ranks | Z±p-value |
|-------------------------------|--------------|----|------------------------|----------------|
| Knowledge | Intervention | 60 | 23,00±1035,00 | -6.006±0,001 |
| | Control | 60 | 15,59±452,00 | -4,863±0,001 |
| Attitude | Intervention | 60 | 26,00±1326,00 | -6,412±0,001 |
| | Control | 60 | 15,62±468,50 | -4,558±0,001 |

**\*Wilcoxon**

**Table 7. Test of Differences in Pre-test Knowledge and Attitudes of Dental Health**

| Value of pre-test | Group | N | Mean Rank±Sum of Ranks | Z±p-value |
|-------------------|--------------|----|------------------------|---------------|
| Knowledge | Intervention | 60 | 65,17±3910,00 | -1,508±0,132 |
| | Control | 60 | 55,83±3350,00 | |
| Attitude | Intervention | 60 | 63,85±3831,00 | -1.079±0,280 |
| | Control | 60 | 57,15±3429,00 | |

**\*Mann-Whitney**

**Table 8. Test of Differences in Pre-test Knowledge and Attitudes of Dental Health**

| Value of post-test | Group | N | Mean Rank±Sum of Ranks | Z±p-value |
|--------------------|--------------|----|------------------------|---------------|
| Knowledge | Intervention | 60 | 74,55±4473,00 | -4868±0,001 |
| | Control | 60 | 46,45±2787,00 | |
| Attitude | Intervention | 60 | 74,43±4466,00 | -4,641±0,001 |
| | Control | 60 | 46,57±2794,00 | |

**\*Mann-Whitney**

## DISCUSSION

Statistical test results using Wilcoxon signature rank showed a significant difference between the results of measurement of dental health knowledge and attitudes of the intervention group before and after being given an android-based dental health monopoly application with a difference value = - 6.006, p-value = 0.00 and difference = - 6,412, p-

value = 0.00 (p-value < 0.05) with an increase in the average value of dental health knowledge and attitudes of 23.00 as many as 45 students and 26.00 as many as 51 students. These results indicate an influence of dental health education media, namely Android-based dental health monopoly game application to increase dental health knowledge and attitudes in the intervention group. The signified rank Wilcoxon test in the control group also showed a significant difference between the results of measurement of dental health knowledge and attitudes before and after being given dental health leaflets with a difference value = -4.863, p-value = 0.00 and Difference = -64.558, p-value = 0.00 (p-value <0.05) with an increase in the average value of dental health knowledge and attitudes of 15.59 as many as 29 students and 15.60 as many as 530 students. These results indicate that there is an impact of dental health leaflets on improving dental health knowledge and attitudes in the control group. These results are in line with other studies that show leaflet media are effective in improving dental health knowledge by being given flyers and asked to read it or not compared to not given leaflets but given orally to patients present at the local dental clinic.[12]

Mann-Whitney test results on the main field test showed no significant difference in value between the pre-test knowledge and dental health attitudes of the intervention and control groups with the difference value = -1,508, p-value = 0,132 and the difference value = -1,79, p-value = 0.280 so that between the two groups can be said to be the same and feasible to compare the post-test value after being given intervention.

Android-based dental health and leaflet monopoly game can both improve students' dental health knowledge and attitudes. However, the increase in the intervention group given the Android-based dental health monopoly game was greater than in the control group given the leaflet. The difference was shown through the mean value of the difference in the intervention group, which was 74.55 and 74.33 while in the control group it was only 46.45 and 46.57. The results of different tests using Mann-Whitney also showed that there were significant differences between the post-test scores of the knowledge and dental health attitudes of the intervention group and the control group

with values of Z = -4868, Sig = 0,000 and Z = -4,641, Sig = 0,000. This significant transformation is because the game application media has the advantage that it can stimulate the effects of motion so that it looks more attractive and easier to stimulate students' cognitive, affective, psycho-motoric, and competitive understanding that can grow a sense of wanting to win. This is corroborated by the results of research which states that the delivery of materials using interactive multimedia can improve the understanding of the material presented compared to conventional learning.[13] The game is a desired learning method, because the game can make learning more entertaining and has been widely used by students and teachers in all age groups in the field of education.[14-16] In the field of dental health education also need the use of game methods to increase students' enthusiasm to know good and bad behavior in dental health and help build confidence in maintaining dental and oral health.

Monopoly game as an android-based dental health education media presents animation, text, images and music that are interesting so that it can overcome students' boredom in learning. One effective media is a media that can overcome boredom in learning.[17] All media have its own strengths and weaknesses. The weakness of this media is just less effective in improving the skills, especially the difficulty of brushing teeth. This is consistent with research which states that counseling utilizing audio visual media and counseling using demonstration methods effectively increases the target knowledge of elementary students. This can be observed in the majority of targets having good brushing knowledge. However, descriptively the extension method uses demonstrations more effectively than audio-visual.[18] In this study there are limitations that researchers use to utilize dental health monopoly applications that are still android, offline and 2D.

## CONCLUSION

The monopoly game is effective as an Android-based dental health education media that can improve gig knowledge and health attitudes

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