



RESEARCH ARTICLE

Cervical Cancer Early Detection Education Through Android-Based Application "Madising" for Women of Fertile Age

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ARTICLE INFO	ABSTRACT
Received: Apr 24, 2024 Accepted: Jun 13, 2024	This study aims to evaluate the effectiveness of using an Android-based application named 'Madising' in improving the knowledge and attitudes of Women of childbearing age regarding early detection of cervical cancer, primarily through the IVA (Visual Inspection with Acetic Acid) examination method. This application was designed as an effort to overcome the low level of public awareness and knowledge, which is one of the main factors why the prevalence of cervical cancer is still relatively high in Indonesia. The study was conducted using a quasi-experimental method, where 62 female respondents of childbearing age were divided into two groups, namely the intervention group and the control group, with a total of 31 respondents each. The intervention group used the 'Madising' application for a week to get education about the early detection of cervical cancer, while the control group only received leaflets as educational materials. This study showed a significant increase in the knowledge and attitudes of women of childbearing age after receiving education using the 'Madising' application compared to the control group. This application was also declared feasible for use as educational media by media and material experts. Based on the results of this study, it can be concluded that the Android-based 'Madising' educational application has great potential as an alternative media in supporting more effective health promotion related to the early detection of cervical cancer.
Keywords Education Android Application Early Detection Cervical Cancer Women of Childbearing Age	
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INTRODUCTION

Cervical cancer is one of the most common types of cancer found in women, especially in developing countries such as Indonesia, where access to health services and awareness of the importance of early detection is still relatively low. [1], [2]. VIA (Visual Inspection with Acetic Acid) screening has been recognized as one of the simple, cheap, and effective early detection methods to prevent cervical cancer from entering more advanced stages. Although the IVA examination method is available in many health facilities, there are still many women of childbearing age who have not fully utilized this service. [3], [4]. This is mainly due to a lack of information and low awareness about the importance

of regular screening and the discomfort or stigma associated with the examination. In dealing with this problem, information technology, especially Android-based applications, can be one of the practical solutions to provide widespread education to the community. [5]–[9]. The "Madising" application was designed to provide easily accessible information about the early detection of cervical cancer and the steps of IVA examination through a *user-friendly platform* to help increase awareness and knowledge and ultimately motivate changes in attitudes of women of childbearing age in conducting early detection of cervical cancer.

1. MATERIALS AND METHODS

This study used a *quasi-experimental* design involving two groups: the intervention group, who were given access to the educational application "Madising," and the control group, who only received *leaflets* as educational materials. Sixty-two women of childbearing age were *purposively* selected based on specific inclusion and exclusion criteria and then divided into two groups, each with 31 members. The intervention group used the "Madising" application for seven consecutive days, where they could access various educational materials on the early detection of cervical cancer, including a video explaining the steps of the IVA examination. In contrast, the control group was only given *leaflets* containing similar information in printed form. Before and after the intervention, both groups were measured on their level of knowledge and attitude regarding early detection of cervical cancer using a validated questionnaire. The data collected were analyzed using the *Wilcoxon signed-rank* statistical test to measure differences in *pretest* and *posttest* within one group and the *Mann-Whitney test* to compare results between the intervention and control groups.

2. RESULTS

a Respondent Demographics

The table below shows the demographic characteristics of the respondents involved in the study, both in the intervention and control groups:

Table 1.1 Characteristics of Respondents in the Intervention Group and Control Group

Characteristics	Intervention		Control		P value*
	n (n=31)	%	n (n=31)	%	
Age					
14 - 20 Years	1	3.2	2	6.5	0.062
21 - 27 Years	6	19.4	6	19.4	
28-32 Years	7	22.6	11	35.5	
>33 Years	17	54.8	12	38.7	
Education					
Low (elementary school)	8	25.8	4	12.9	0.460
Intermediate (junior high school-high school)	21	67.7	27	87.1	
Higher (Diploma, Bachelor, Master)	2	6.5	0	0	
Jobs					
Housewife	29	93.5	31	100	0.31
Employed (Civil Servant, Private)	2	6.5	0	0	
Not Working	0	0	0	0	

**Chi-Square Test*

From the data above, it can be seen that most respondents are above 33 years old, have secondary education (junior high school-high school), and are primarily housewives. Based on the Chi-square statistical test results, no significant differences were found between the two groups regarding age, education, or occupation, indicating that the two groups have similar and homogeneous demographic characteristics.

b Effect of Educational Media on Knowledge of Women of Fertile Age

The following table illustrates the change in knowledge of respondents in both groups before and after the intervention:

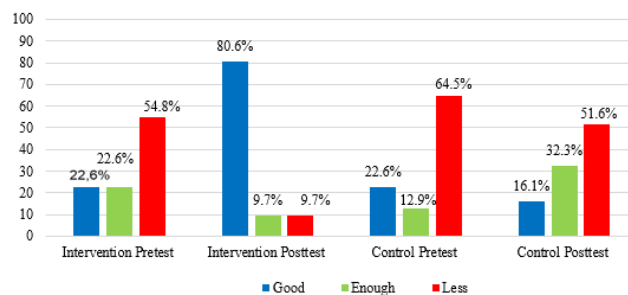
Table 1.2 Improvement in Knowledge of Women of Fertile Age Pretest and Posttest

Knowledge	Knowledge			p-value
	Good (n=31) %	Simply (n=31) %	Less (n=31) %	
Intervention				
Pre-test	7 (22.6)	7 (22.6)	17 (54.8)	0.000
Post-test	25 (80.6)	3 (9.7)	3 (9.7)	
Control	(n=31) %	(n=31) %	(n=31) %	
Pre-test	7 (22.6)	4 (12.9)	20 (64.5)	0.800
Post-test	5 (16.1)	10 (32.3)	16 (51.6)	

**Wilcoxon test*

The results from the table above show that there was a significant increase in knowledge in the intervention group after being given education through the Madising application. Before the intervention, only 22.6% of respondents in the intervention group had a good understanding, and the majority (54.8%) were in the deficient category. However, 80.6% of respondents showed good knowledge after the intervention, while the deficient knowledge category decreased to only 9.7%.

In contrast, in the control group, the improvement in knowledge was not significant. Before the intervention, 22.6% of respondents had a good understanding, but only 16.1% showed improvement after the intervention, while the category of poor knowledge was still relatively high, at 51.6%. The Wilcoxon test results for the intervention group showed a p-value of 0.000 ($p < 0.05$), which means there was a significant increase in knowledge. On the other hand, the Wilcoxon test for the control group showed a p-value of 0.800 ($p > 0.05$), meaning there was no significant change.



Graph 1.1 Improvement In Knowledge Of Woven Of Childbearing Age Pretest And Posttest

Graph 1.1 shows that in the intervention group, the number of individuals in the "Good" category increased from 7 people (22.6%) in the pretest to 25 people (80.6%) in the posttest, for the "sufficient" category decreased from 7 people (22.6%) to 3 people (9.7%), while for the "less" category also decreased from 17 people (54.8%) to 3 people (9.7%). In the control group, the "good" category decreased from 7 people (22.6%) in the pretest to 5 people (16.1%) in the posttest, for the "moderate" category increased from 4 people (12.9%) in the pretest to 10 people (32.3%) in the posttest. In comparison, the "less" category decreased from 20 people (64.5%) in the pretest to 16 people (51.6%).

Table 1.3 Analysis of Differences in Knowledge Improvement of women of childbearing age between Intervention and Control groups

Knowledge	Pretest	Posttest
	Mean rank	Mean rank
Intervention (n=31)	32.66	41.79
Control (n=31)	30.34	21.21
P value	0.564	0.000

**Mann Whitney Test*

The test results in Table 4.3 show that the level of knowledge after being analyzed using the Mann-Whitney test shows that there is an increase in knowledge in the intervention group before being given the treatment of educational media android-based applications has an average value of 32.66 and after treatment has an average value of 41.79. In the control group, there was a decrease in knowledge; in the intervention group, before being given leaflet media treatment, had an average value of 30.34, and after treatment, had an average value of 21.21.

The results of the Mann-Whitney test analysis between the intervention and control groups at the pretest obtained p value = 0.564 ($p > 0.05$), which means there was no significant effect on knowledge between the intervention and control groups before the intervention. In the posttest, the p -value = 0.000 ($p < 0.05$) significantly influences knowledge between the intervention and control groups.

The increase in knowledge of women of childbearing age (WUS) in the intervention group occurred because the Madising application was interactive and interesting. Features such as videos, quizzes, and repetition of materials made it easier for respondents to understand and remember information. Flexible access and familiar technology also increased comfort and active participation, thus motivating respondents to learn better.

In contrast, the decrease in knowledge in the control group was caused by the passive nature of the leaflet which was less interactive, making information easily forgotten. Lack of motivation to read, cognitive adjustment effects, and external factors such as busyness and lack of time also influenced the results. The absence of supporting features such as discussions or videos in the leaflet made the learning process less effective. This finding confirms that interactive educational media such as the Madising application is superior in increasing and maintaining knowledge compared to conventional media.

c The Effect of Educational Media on Attitudes

The following table shows the changes in attitudes of women of childbearing age towards early detection of cervical cancer before and after the intervention:

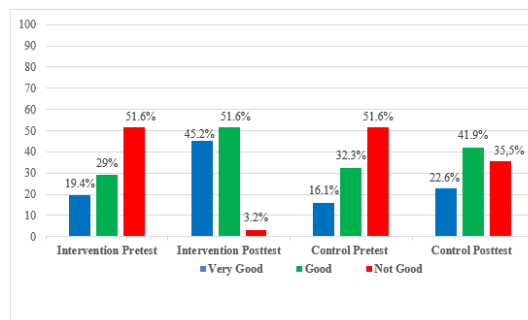
Table 1.4 Changes in Attitudes of Women of Fertile Age Pretest and Posttest

Attitude	Attitude			P-value
	Very good %	Good %	Not good %	
Intervention (n=31)				
Pre-test	6 (19.4)	9 (29.0)	16 (51.6)	0.000
Post-test	14 (45.2)	16 (51.6)	1 (3.2)	
Control (n=31)				
Pre-test	5 (16.1)	10 (32.3)	16 (51.6)	0.268
Post-test	7 (22.6)	13 (41.9)	11 (35.5)	

**Wilcoxon test*

Table 1.4 shows the attitudes of women of childbearing age (WUS) in the pretest intervention group, in the Very Good category, 6 people (19.4%), in the Good category, 9 people (29.0%), and not good, namely 16 people (64.5%). Meanwhile, in the posttest, the very good category increased to 14 people (45.2%), and the good category also increased to 16 people (51.6%), while the not good category decreased by 1 person (3.2%). In the Wilcoxon Test for the intervention group, a p value of 0.000 was obtained ($p < 0.05$). Thus, it can be concluded that there is a significant impact on the attitudes of women of childbearing age (WUS).

In the control group, the attitudes of women of childbearing age (WUS) in the pretest were in the Very Good category, 5 people (16.1%), in the Good category, 10 people (32.3%), and not so good, namely 16 people (51.6%). Meanwhile, in the posttest, the very good category increased to 7 people (22.6%), and the good category also increased to 13 people (41.9%), while the not good category decreased to 11 people (35.5%). In the Wilcoxon Test for the intervention group, a p value of 0.268 ($p > 0.05$) was obtained, which indicated that there was no significant impact on the attitudes of women of childbearing age (WUS).



Graph 1.2 Improvement In Attitudes Of Wonen Of Childbearing Age Pretest And Posttest

In Graph 1.2, the intervention group showed a significant increase in the "Very Good" category from pretest to posttest, increasing from 6 people (19.4%) to 14 people (45.2%). The "Good" category also increased from 9 people (29.0%) to 16 people (51.6%), and the "Not Good" category decreased from 16 people (51.6%) to 1 person (3.2%). In the control group, the "Very Good" category increased from 5 people (16.1%) to 7 people (22.6%), the "Good" category also risen from 10 people (32.3%) to 13 people (41.9%), and the "Not Good" category decreased from 16 people (51.6%) to 11 people (35.5%).

Table 1.5 Analysis of Differences in Changes in attitudes of women of childbearing age between Intervention and Control groups

	Pretest	Posttest
	Mean rank	Mean rank
Intervention (n=31)	31.74	37.63
Control (n=31)	31.26	25.37
P value	0.908	0.004

**Mann Whitney Test*

The test results in Table 1.5 show that the level of attitude change after being analyzed using the Mann-Whitney test shows that there is a change in attitude, in the intervention group before being given the treatment of android-based application educational media has an average value of 31.74 and after treatment has an average value of 37.63. In the control group, there was a decrease in attitude change; in the intervention group, before being given leaflet media treatment, it had an average value of 31.26; after treatment, it had an average value of 25.37.

The results of the Mann-Whitney test analysis between the intervention and control groups at the pretest obtained p value = 0.908 ($p > 0.05$), which means there was no significant effect on knowledge between the intervention and control groups before the intervention. In the posttest, the p-value = 0.004 ($p < 0.05$) means that there is a significant effect on attitude change between the intervention and control groups.

3. DISCUSSION

The findings of this study confirm that education through Android-based applications, such as "Madising," has a more significant impact in improving the knowledge, attitudes, and behaviors of women of childbearing age-related to early detection of cervical cancer, compared to conventional educational media such as *leaflets*. [10]–[14]. These applications provide more interactive and engaging information and allow users to access educational materials anytime and anywhere, thus providing greater flexibility for users to learn in the most convenient way. The results of this study are consistent with previous studies showing that the use of information and communication technology in health promotion, primarily through *mobile* applications, can be a very effective tool in delivering health messages to the broader community. [15]–[19]. In addition, this study also highlights the importance of a more modern and technological approach to health promotion efforts in the digital era, where access to information has become easier and faster through the use of mobile devices.

4. CONCLUSIONS

- a. The application has been successfully created and can be tested on respondents well namely, including the success of the application in meeting technical, educational and acceptance standards by respondents and providing a positive impact according to the research objectives.
- b. There is a difference in the increase in knowledge of women of childbearing age regarding IVA test examination between the group given the educational intervention of the Madising android-based application and the group given the leaflet in Kalebentang Village, Galesong District, Takalar Regency.
- c. There was a decrease in knowledge in the control group from the good category during the

pretest to the posttest due to several factors. One of them is the lack of ongoing intervention, because leaflets as educational media are passive and less interactive. Information obtained during the pretest is easily forgotten, especially if respondents do not have the motivation to read or understand the contents of the leaflet properly.

- d. There is a difference in changes in the attitude of women of childbearing age regarding IVA test examination between the group given the educational intervention of the Madising android-based application and the group given the leaflet in Kalebentang Village, Galesong District, Takalar Regency.

This study shows that the use of the Android-based educational application "Madising" significantly increases knowledge and improves attitudes of women of childbearing age towards early detection of cervical cancer through IVA examination. This application proved effective educational media, providing better results than traditional media such as leaflets. Thus, mobile applications such as Madising can be integrated into health education programs to improve community knowledge and attitudes towards early detection of cervical cancer.

5. Advice

This study provides several important recommendations, including that the "Madising" app should be further developed by adding more engaging interactive features and testing in a larger population to see its effectiveness in the long term. In addition, it is recommended to combine various educational methods, such as digital apps, interactive videos, and group discussions, to reach different types of learners and increase the effectiveness of health education programs.

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Author names, paper title, journal heading, Volume, Number., pages for journal citations, Year, DOI. Journals

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