

# Effect of E-Duva application on knowledge and attitude of visual inspection using acetic acid (VIA) among women of childbearing age

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## Abstract

E-Duva is an application model designed to introduce innovations for delivering information and education about visual inspection with acetic acid (VIA) tests. The use of the E-Duva application can facilitate access to information and education for mothers with-

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out the need to visit a healthcare facility to learn about the VIA test. This study aimed to assess the effectiveness of the E-Duva application on the knowledge and attitudes of women of childbearing age (WUS). The study population comprised women of childbearing age (WUS). We employed a quasi-experimental research design with a pretest-posttest design using non-probability purposive sampling. The total sample size in this study was 30 respondents, with 15 women in the control group and 15 women in the intervention group. A questionnaire was used to assess the knowledge of WUS regarding cervical cancer and the VIA test. Statistical analysis was conducted using the Paired T-test. The study results indicate a significant increase in knowledge in both the experimental group ( $p=0.000$ ; mean SD  $90.88\pm 6.9$ ) and the control group ( $p=0.000$ ; mean SD  $78.40\pm 10.1$ ). Attitudes toward early detection of cervical cancer were significantly related ( $p=0.015$ ). This suggests that a more positive attitude towards early detection of cervical cancer among WUS is associated with a greater willingness to undergo cervical cancer screening. The findings of this study support the role of the E-Duva application in enhancing the knowledge and attitudes of women of childbearing age regarding VIA tests and cervical cancer, emphasizing the potential of technology-driven health education in improving women's health outcome.

## Introduction

Cervical cancer, also known as cervical carcinoma, is a malignant tumor that primarily affects the surface layer (epithelium) of the cervix or uterine cervix.<sup>1</sup> Infection from the Human Papillomavirus (HPV) is the leading cause of cervical cancer.<sup>2,3</sup> HPV is transmitted through sexual intercourse and is responsible for approximately 95% of cervical cancer cases.<sup>4</sup> According to the World Health Organization (WHO), approximately 490,000 women worldwide are diagnosed with cervical cancer annually.<sup>5</sup> In Indonesia, it is estimated that there are 40-45 new cases daily, resulting in 20-25 fatalities, equating to approximately one woman losing her life to cervical cancer every hour.<sup>6</sup> This staggering statistic implies that Indonesia faces the loss of 600-750 productive women every month.<sup>7</sup>

The lack of knowledge among women about cervical cancer often leads to delays in diagnosis, resulting in patients presenting with advanced cancer stages, weakened overall health, low socioeconomic status, and limited access to healthcare resources, facilities, and infrastructure.<sup>8</sup> The increasing incidence of cervical cancer can also be attributed to the absence of effective screening programs for early detection and treatment of pre-cancerous conditions.<sup>9</sup>

The coverage of early detection for cervical cancer through VIA tests remains very low at approximately 5%,<sup>10</sup> despite the potential for early detection to significantly reduce morbidity and mortality rates.<sup>11</sup> Understanding the importance of the VIA test is vital for fostering the willingness and awareness needed for its

adoption.<sup>12</sup> As of 2019, the screening coverage for early detection of cervical and breast cancer in Indonesia was still minimal, with only 909,099 screenings (3.5%), 49,659 positive VIA results (5.93%), and 1,086 suspected cervical cancer cases (1.2 per 1,000 people).<sup>13,14</sup> An ideal screening implementation should reach 80% of the female population in a given area.<sup>15,16</sup> Attitudes remain a significant barrier for women of childbearing age (WUS) when it comes to early detection of cervical cancer.<sup>17</sup> Shifting people's attitudes toward early detection can be achieved through health behavior interventions.<sup>18</sup> Factors associated with attitudes regarding cervical cancer early detection screening include knowledge and maternal age.<sup>19</sup> Among these factors, attitude is the most influential in motivating mothers to undergo VIA tests.<sup>20</sup> Negative attitudes toward the VIA test often result from a lack of awareness regarding its significance, leading women to underestimate its importance.<sup>21</sup>

Modern health services are increasingly embracing smartphone applications, providing individuals with convenient access to information irrespective of time and location.<sup>22</sup> These applications, which operate on smartphones, offer a wide range of functions.<sup>23</sup> The rapid advancement of technology has permeated all aspects of life, offering tools that enhance daily activities.<sup>24</sup> As per health regulations, technology plays a pivotal role in disease prevention, allowing health workers to leverage the widespread availability of smartphones for disease prevention and control.<sup>25,26</sup>

"E-Duva" is an application model developed to deliver information and education about VIA tests. E-Duva, short for Education for VIA Test, simplifies access to information and education for mothers, eliminating the need for them to visit healthcare facilities to learn about the VIA test. The E-Duva application only requires a one-time download and can be used continuously without an internet connection. Given this description, our research aims to investigate the effectiveness of the E-Duva Application among women of childbearing age.

## Materials and Methods

The study population consisted of women of childbearing age in the Samarinda region who visited the Clinic and Puskesmas.

This research employed a Quasi-Experimental research design with a pretest-posttest design and a control group. This design was utilized to assess the effectiveness of the Educational Application of VIA test (E-Duva) on Women of Childbearing Age (WUS) through purposive sampling. In this study, the independent variable was the application of the Educational Application of VIA test (E-Duva), and the dependent variable was the change in knowledge and attitude of WUS. The sampling technique used in this study was non-probability sampling. The total sample size was 30 respondents, with 15 women in the control group and 15 women in the intervention group. A questionnaire was employed to gauge the level of knowledge among WUS regarding cervical cancer and the VIA test. The research utilized the Paired T-Test. Respondents in this study used the E-Duva application five times over a two-week period. Inclusion criteria encompassed women of childbearing age who were married, willing to participate in the study, possessed a smartphone, were aged between 20 and 35 years, and could operate it. Exclusion criteria included individuals who did not have a smartphone or had a smartphone but were unable to operate it. The intervention group received education through the application, while the control group received education through a leaflet. Ethical clearance was obtained with the number DL.02.03/4.3/10434/2022 from Poltekkes Kemenkes Kalimantan Timur. Respondents were provided with explanations on how to complete informed consent. They were also informed about the potential risks associated with the study and were granted the right to withdraw voluntarily. No coercion was exerted during this study.

## Results

Based on the information presented in Table 1, it is evident that the most common age group in this study was 25-28 years, comprising 33.3% of the total sample, and 40% in the control group. Additionally, the most common parity in this study was primipara, with 60% of the total sample and 26.7% in the control group.

Based on the data presented in Table 2, it is evident that in the intervention group using the E-Duva Application, the mean value increased from 70.40 in the pretest to 90.88 in the post-test. In the

**Table 1.** Frequency distribution of respondents' characteristics based on age, and parity.

Characteristic	Groups	
	Intervention n (%)	Control n (%)
Age/Mean ±SD	28.33±4.1	29.27±3.9
20-24	3 (20)	0 (0)
25-28	5 (33.3)	6 (40)
29-32	5 (33.3)	7 (46.7)
33-35	2 (13.3)	2 (13.3)
Parity		
Primipara	9 (60)	11 (73.3)
Multipara	6 (40)	4(26.7)
Total	30 (100%)	30 (100%)

**Table 2.** Mean difference between pretest and posttest score on the application of educational application for VIA Test (E-Duva) in experimental group and control group.

Group	Mean		p
	Pretest	Post-test	
Experiment	70.40	90.88	0.000*
Control	71.20	78.40	0.000*

\*p<0.05.

control group that received the leaflet, there was an increase in the mean value from 71.20 in the pretest to 78.40 in the post-test. The results of the paired sample t-tests conducted on both groups indicated a p-value of <0.05. This suggests that there is a significant difference between the pretest and post-test values in both the experimental and control groups. This significant difference signifies an increase in knowledge in both the experimental and control groups.

Based on the data presented in Table 3, it is evident that there is a significant relationship between attitude towards early detection of cervical cancer and the p-value is 0.015. This finding indicates that as Women of Childbearing Age (WUS) develop a more favorable attitude towards early detection of cervical cancer, they are more likely to be willing to undergo early detection measures for cervical cancer.

## Discussion

The E-Duva application can be categorized as mobile learning-based educational media. This classification aligns with the definition of mobile learning, which involves learning where learners are not confined to a specific location and utilize mobile technology devices for educational purposes. The E-Duva application offers several advantages, including compatibility with Android-based devices, attractive and easily understandable presentation of materials, and the inclusion of engaging images.

The smaller increase in knowledge scores observed in the control group can be attributed to the fact that it relied solely on visual information. Additionally, the content provided in the leaflet was more limited and concise in comparison to the material accessible to the intervention group through the E-Duva Application. This observation aligns with Edgar Dale’s cone theory, which posits that the effectiveness of teaching aids is influenced by the extent to which knowledge is delivered through the five senses.<sup>27</sup> The more senses involved in learning, the richer and clearer the knowledge acquired.<sup>28</sup>

In the intervention group using the E-Duva Application, there was a noticeable increase in the mean score, rising from 70.40 in the pretest to 90.88 in the post-test. Conversely, in the control group, which received information through leaflets, the mean score increased from 71.20 in the pretest to 78.40 in the post-test. This finding corroborates previous research indicating that health promotion via mobile phones is easily accepted due to the convenience and confidentiality of interactions on mobile platforms, which offer simpler and more informative content.<sup>29</sup> Providing health-related information, particularly regarding sexually transmitted infections (STIs), through mobile media has been shown to enhance respondents’ knowledge about reproductive health and

STIs.<sup>30</sup> Text messaging programs have also proven effective in improving knowledge of reproductive health.<sup>31</sup>

The significant relationship between a positive attitude toward early detection of cervical cancer (with a p-value of 0.015) highlights the correlation between attitude and the willingness to undergo cervical cancer early detection checks.<sup>32</sup> This aligns with previous research that suggests smartphone applications effectively influence women’s positive attitudes toward early detection of cervical cancer.<sup>33</sup> Presenting information in a visually engaging manner is considered more effective and efficient than traditional methods. Smartphone applications aid in comprehension by displaying interesting visual elements, making respondents more engaged, receptive, and less likely to find the material boring.<sup>34</sup>

Efficient information dissemination about the VIA test is achieved through health education, which aims to improve the knowledge and attitudes of women of childbearing age.<sup>35</sup> The relationship between good knowledge of the VIA test and a positive attitude is evident in the motivation to undergo the VIA Test. Attitude reflects a mother’s preference and is a significant influence on the decision to undergo the VIA test.<sup>36</sup> Attitude represents a person’s response to a stimulus or object, which is not directly observable but can be inferred from their behavior. Women of childbearing age should not only possess knowledge about early detection of cervical cancer through the VIA method but also exhibit it in their attitudes<sup>37</sup>. Women with a positive attitude are more likely to seek early detection of cervical cancer through the VIA test<sup>38</sup>

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Convenient access to information plays a pivotal role in changing health behaviors, especially in promoting early detection of cervical cancer. The accessibility of health information is a determining factor in the level of knowledge and attitudes, ultimately influencing the behavior of women of childbearing age.<sup>43,44</sup> The E-Duva application streamlines access to information and education, eliminating the need for physical visits to healthcare facilities. It requires a one-time download and can be used offline. However, the study identified limitations, including the application’s size (about 21 MB), which may challenge users with limited smartphone memory. Additionally, the application is not compatible with iOS devices, and some smartphones may have stringent security settings that hinder installation, which can be addressed by adjusting these settings to allow for installation.

**Table 3.** Attitude about the application of educational application for VIA test (E-Duva).

Variables	Yes		No		p
	n	%	n	%	
Attitude					0.015*
Support	47	85.5	8	14.5	
Not supportive	27	64.3	15	35.7	

\*p<0.05.

## Conclusions

The E-Duva application has been effectively developed to provide information about VIA examinations, cervical cancer, and guidelines for assessing the nutritional status of women of fertile age (WUS). It underscores the importance of technology-based health education as a means to enhance public awareness, particularly among women of childbearing age. Given the widespread use of smartphones in today's society, educational resources in the form of Android applications are essential and deserve further development.

Furthermore, the E-Duva application has been demonstrated to successfully enhance the knowledge and attitudes of women of childbearing age concerning VIA tests and cervical cancer. This underscores the significance of leveraging technology and mobile applications to promote health education and improve outcomes in women's health.

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