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DOI: [10.31965/infokes.Vol20Iss2.822](https://doi.org/10.31965/infokes.Vol20Iss2.822)Journal homepage: <http://jurnal.poltekkeskupang.ac.id/index.php/infokes>**RESEARCH****Open Access****The Effect of Multimedia-Based Education on Knowledge, Attitudes, and Behavior Hypertension Patients in Stroke Prevention****Santa Manurung<sup>1a\*</sup>, Suratun<sup>1b</sup>, Wartolah<sup>1c</sup>, Ni Luh Putu Ekarini<sup>1d</sup>, Raden Siti Maryam<sup>1e</sup>**<sup>1</sup> Department of Nursing, Politeknik Kesehatan Kementerian Kesehatan Jakarta III, Bekasi City, West Java, Indonesia<sup>a</sup> Email address: [santamanurung@yahoo.com](mailto:santamanurung@yahoo.com)<sup>b</sup> Email address: [suratunharyono@yahoo.com](mailto:suratunharyono@yahoo.com)<sup>c</sup> Email address: [wartolah03@yahoo.co.id](mailto:wartolah03@yahoo.co.id)<sup>d</sup> Email address: [ekaputu98@yahoo.com](mailto:ekaputu98@yahoo.com)<sup>e</sup> Email address: [raden.maryam@poltekkesjakarta3.ac.id](mailto:raden.maryam@poltekkesjakarta3.ac.id)

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**Abstract**

The prevalence of hypertension continues to increase, and various epidemiological studies revealed an increase in the incidence of hypertension in different parts of the world. According to the American Heart Association (AHA), The number of Americans over the age of 20 who suffer from hypertension has risen to 74.5 million, while nearly 90% of cases have no identified cause. If not treated effectively, hypertension may cause damage to blood vessels throughout the body, the most prominent of which is the danger of damage to the brain, eyes, heart, and kidneys. An introduction to stroke is essential for reducing the risk of stroke in people with hypertension. Multimedia is one of the developments in health education media, which is in accordance with the advancement of digital technology, incorporating stroke prevention. This study aims to examine the impact of multimedia-based education on hypertension patients' knowledge, attitudes, and behavior toward stroke prevention. This research is a quasi-experiment with a pre-posttest with a control group design. The sampling technique employed was simple random sampling, and the sample size determination utilized a hypothesis test of the average difference in two independent groups of 60 respondents. Data analysis in this study administered paired t-test and independent t-test. The results unveiled that there were significant differences in knowledge ( $p=0.022$ ), attitudes ( $p=0.001$ ), and behavior ( $p=0.008$ ) of hypertension patients in preventing stroke after intervention in the form of multimedia-based education. Therefore, it is recommended that the community can perform hypertension treatment independently frequently, and the implementation of the prolanis program can be enhanced so that people can receive services easily and regularly to prevent stroke.

**Keywords:** Multimedia, Education, Hypertension, Stroke Prevention.**\*Corresponding Author:**

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## 1. INTRODUCTION

Hypertension, well-known as high blood pressure, is a health problem frequently discovered in developing and developed countries (Malik et al., 2014). In adults with hypertension, the systolic pressure is more than 140 mmHg, and the diastolic pressure is more than 90 mmHg (Yano et al., 2015). High blood pressure can be perceived as a symptom, a risk factor, or a disease. Hypertension is generally referred to as the silent killer in which symptoms can vary in every individual and are almost similar as symptoms of other diseases, or even several sufferers do not experience any symptoms (Bell et al., 2015).

According to the World Health Organization (2013), the global population of hypertension sufferers has surpassed 1.13 billion persons. WHO estimate that over 1.56 billion persons will have hypertension by 2025. Meanwhile, the prevalence of hypertension in Indonesia is 31.6% in the 31–44-year age group, 45.5% in the 45–54-year age group, and 45.35% in the age group (World Health Organization, 2013). The age group of 55 to 64 years old accounted for 55.2% (World Health Organization, 2013). WHO asserted that the number of people affected by high blood pressure escalates with age, with 1 in 10 in their 20s and 5 in 10 in their 50s (World Health Organization, 2013). Hence, early detection is critical, and every adult should be aware of their blood pressure and keep it within normal ranges.

In Indonesia, the problem of hypertension is a robust challenge, as hypertension is frequently discovered in primary health services with a high prevalence. In accordance with Basic Health Research in 2013, it obtained around 25.8%. This presents that there is an increase in the prevalence of hypertension from 7.6% in 2007 to 9.5% in 2013, and the figure is higher in the elderly (Kementerian Kesehatan Republik Indonesia, 2013). Furthermore, hypertension control has not been adequate even though effective drugs are extensively available. Meanwhile, Basic Health Research (2018) demonstrates that 34.1% of the Indonesian population aged 18 years suffer from hypertension, with an estimated number of cases of 63,209,620 people. Meanwhile, the cases of death due to hypertension in Indonesia are at 427,218 deaths (Kementerian Kesehatan Republik Indonesia, 2018).

The elderly population is a vulnerable group in society, which is at risk and is more sensitive to exposure to various risk factors, incorporating economic, social, physical, biological, genetic, and lifestyle factors (Lionakis et al., 2012). Factors associated with vulnerability encompass low socioeconomic status, an unhealthy lifestyle, low self-esteem, helplessness, and inability to take care of oneself. Meanwhile, risk factors predisposing to health problems incorporate environmental, nutritional, and sociocultural factors (Ungar et al., 2013).

Hypertension is a disease which generally affects the elderly, characterized by blood pressure above normal, frequently does not cause symptoms, thus it is referred to as the silent killer (Cherubini et al., 2010). It is predicted that there are 76% cases of hypertension in the community that have not been diagnosed, in this case a person does not understand that he or she suffers from hypertension. These diseases are the prior causes of disability in the elderly, hence, they become a burden for families, communities and governments (Rayanti et al, 2021).

Data obtained from the Cipayung Sub-district Health Center, East Jakarta, illustrates that in 2016 hypertension patients who came for treatment with new visits were 96 people, and old visits were 533 people, thus, the total visits were 629 people. In 2017, this ailment perceived a significant increase, with 119 new hypertension patients visiting, 1636 old hypertension patients visiting, for a total of 1755 hypertension patients visiting for treatment. It is a tremendously significant issue that necessitates care, particularly from health experts, to administer prevention and treatment programs for patients. Complications from untreated hypertension encompass stroke, coronary heart disease, diabetes, kidney failure, and blindness.

Stroke is the leading cause of death (51%), whereas targeting organ damage from hypertension consequences can vary depending on the size of the increase in blood pressure and the length of undiagnosed and untreated blood pressure issues.

Research associated with stroke has been conducted by numerous researchers, but the combination of multimedia-based education, which is the development of non-pharmacological therapy, is deemed necessary for further research. This research is done by developing a multimedia-based educational model for people with hypertension. Hence, it can enhance the health status of the sufferers through stability or decreasing blood pressure to near normal. This study aims to examine the impact of multimedia-based education on hypertension patients' knowledge, attitudes, and behavior toward stroke prevention.

## 2. RESEARCH METHOD

This study employed a quasi-experimental pre-posttest control group design. This research was conducted in the DKI Jakarta area. The study population was all hypertensive patients who visited Cipayung Village Health Center, East Jakarta. The sampling strategy administered simple random sampling. The sample size utilized the hypothesis test of the mean difference in two independent groups (Lemeshow et al., 1990). The sample in this study was 60 people incorporating 30 people in the intervention group and 30 people in the control group. For sampling, simple random sampling technique was performed from an affordable population. The inclusion criteria in this study were patients suffering from hypertension who came for treatment at the Cipayung Village Health Center, the age of the patient was 35-60 years, could write and read, at least graduated from elementary school, and was willing to be the subject of the study. Meanwhile, the exclusion criteria formulated were hypertensive patients with complications and patients who withdrew to become respondents.

The first stage of this research involved developing educational instruments, which included activities such as creating modules/pocket books and educational videos, testing multimedia-based education, training enumerators in implementing multimedia-based education, and administering pre-tests to respondents (intervention and control groups). The second stage comprises of implementing multimedia-based education in the intervention group and administering a post-test to all respondents at week 9.

To avoid misconceptions, the data collection instrument was a questionnaire produced by researchers that was constructed with closed and open questions employing simple language and easy to comprehend by respondents. Researchers created the teaching instrument utilized in multimedia-based education in the form of modules and videos.

Data analysis will be performed to examine the effect of multimedia education on knowledge, attitudes, and behavior of hypertensive patients in preventing stroke before and after the intervention by employing paired t-test and independent t-test statistical tests. Meanwhile, to analyze the effect of the characteristics of hypertension patients on the knowledge, attitudes, and behavior of hypertensive patients, the Multiple Logistics Regression statistical test was conducted. This research has passed the ethical test from the Ethics Committee of the Jakarta Health Polytechnic III Number KEPK-PKJ3/055/VII/2021.

## 3. RESULTS AND DISCUSSION

**Table 1.** Distribution of respondents' characteristics based on age and duration of illness hypertension

Variable	Group	N	Mean	Median	Min-Max
Age	Intervention	30	63.77	63	49 - 71
	Control	30	54.33	53.50	31 - 69
Duration of illness	Intervention	30	6.47	5	2 - 28
	Control	30	3.73	3	1 - 12

Based on Table 1, the average age of the intervention group respondents was 63.77 years, with the youngest being 49 years old and the oldest being 71 years old. Meanwhile, the average age of patients with hypertension in the control group was 54.33 years, with the youngest being 31 years and the oldest being 69 years. In the intervention group, the average length of illness was 6.47 years, with a minimum of 2 years and a maximum of 28 years, whereas in the control group, the average length of illness was 3.73 years, with a minimum of 1 year and a maximum of 12 years.

**Table 2.** Distribution of respondents' characteristics by gender and education.

Variable	Intervention		Control		Total	
	N	%	N	%	N	%
<b>Gender</b>						
Man	12	40	9	30	21	35
Women	18	60	21	70	39	65
<b>Education</b>						
Elementary school	11	36.7	5	16.7	16	26
Junior high school	8	26.7	11	36.7	19	31.6
Senior high school	8	26.7	12	40	20	33
College	3	10	2	6.7	5	8.4

Table 2 demonstrated that the genders in both groups of hypertension sufferers were frequently women. The educational background of the majority of respondents is elementary school for the intervention group, while the control group is the majority of respondents with junior high school education.

**Table 3.** Analysis of gender equality and education of patients with hypertension.

Variable	Intervention		Control		p-value
	N	%	N	%	
<b>Gender</b>					
Man	12	40	9	30	0.588
Women	18	60	21	70	
<b>Education</b>					
Elementary school	11	36.7	5	16.7	0.293
Junior high school	8	26.7	11	36.7	
Senior high school	8	26.7	12	40	
College	3	10	2	6.7	

Table 3 illustrated that there was no difference in the variables of gender and education between the intervention group and the control group. Thus, it can be concluded that the respondent's gender and education between the two groups were equivalent.

**Table 4.** Analysis of equality in age and duration of hypertension between groups.

Variable	Group	N	Mean	SD	p-value
Age	Intervention	30	63.77	6.942	0.000
	Control	30	54.33	9.407	
Duration of illness	Intervention	30	6.47	5.151	0,014
	Control	30	3.73	2.888	

Table 4 displayed that there was a difference in age between the intervention group and the control group, as well as the variable duration of hypertension. The results of the analysis presented that there was a difference between the intervention group and the control group.

**Table 5.** Analysis of knowledge, attitudes and behavior in stroke prevention before and after multimedia-based educational intervention in the intervention and control groups.

Variable	Group	Mean	SD	95% CI	T	p-value
Knowledge	Intervention					
	Pre-test	18.2000				
	Post-test	19.2667	4.118	-2.604 – 0.471	-3.419	0.022
	Difference	-1.0666				
	Control					
	Pre-test	17.9333				
Attitudes	Intervention					
	Pre-test	34.0667				
	Post-test	36.1000	3.156	-3.212 – -0.854	-3.528	0.001
	Difference	-2.0333				
	Control					
	Pre-test	33.1667	1.142	-0.493 – 0.360	-0.320	0.752
Behavior	Intervention					
	Pre-test	9.3000	1.162	-1.034 – -0.165	-2.827	0.008
	Post-test	9.9000				
	Difference	-0.6000				
	Control					
	Pre-test	8.0333	0.944	-0.285 – 0.419	0.387	0.702

Table 5 indicates that there is a significant difference in knowledge scores between the intervention and control groups before and after the multimedia-based educational intervention (p value = 0.022), with the difference in the average score of increasing health status scores in the intervention group being significantly larger (difference value = 1.066), while the difference in score in the control group is 0.166. The table above also demonstrates that there is a significant difference in attitude scores before and after the multimedia education intervention in the intervention group (p value = 0.002), and the difference in the average value of the increase in attitude scores in the intervention group is significantly increased (difference value = 2.033), whereas the average difference in attitude scores in the control group is 0.667. Similarly, there was a significant difference in behavioral scores in the intervention group before and after the multimedia education intervention (p value = 0.008), and the difference in the average behavioral score in the intervention group was 0.600, while the difference in the control group was 0.600. It indicates that respondents in the control group had an increase in hypertension treatment behavior, which can be acquired through a variety of other media.

**Table 6.** Analysis of knowledge, attitudes and behavior in stroke prevention between groups.

Variable	Group	N	Mean	SD	95% CI	F	p-value
Knowledge	Intervention	60	-1.07	2.421	-2.203- -0.263	8.561	0.014
	Control	60	0.17	1.020			
Attitudes	Intervention	60	-2.03	3.157	-3.109 - -0.624	14.582	0.004
	Control	60	-0.17	1.262			
Behavior	Intervention	60	-0.60	1.163	-1.214 – 0.119	2.945	0.018
	Control	60	0.07	0.944			

Table 6 demonstrates that there are significant differences in the knowledge, attitudes and behavior scores of hypertension sufferers in preventing stroke between the intervention group and the control group after the multimedia education intervention with p value = 0.014; 0.004; and 0.018. In accordance with the results of this study, it can be implied that there is a significant effect of multimedia education intervention on hypertension treatment on escalating knowledge, attitudes and behavior of hypertensive patients to conduct hypertension treatment in order to prevent stroke.

The results illustrated that the lowest age of patients with hypertension in the intervention group was 49 years and the oldest was 71 years, while in the control group, the lowest was 31 years and the highest was 69 years. The results of this study are in accordance with research performed by Saputri & Indrawati (2011) which explains that the majority of respondents are aged between 60-74 years, both in the control group and in the intervention group. Hypertension is associated with age, the older a person is, the greater the risk of developing hypertension (Gao et al., 2013). Increasing age affects a loss of elasticity of the arteries due to natural changes in the heart, blood vessels and hormones. Large arteries lose their elasticity, thus, they become stiff and blood with each heartbeat is insisted to pass through the narrow blood vessels and eventually affects an increase in blood pressure (Dinata, 2015).

Increased blood pressure can also be affected by various risk factors, including: age, gender, family history, obesity, high salt levels, and poor living habits such as smoking and drinking alcohol (Pinto & Martins, 2017). If a patient has risk factors, they should be more vigilant and take preventive steps immediately. For instance, the easiest efforts involve frequently controlling blood pressure more than once, exercising, and avoiding other hypertension trigger factors (Saratun et al., 2018).

The results of the study discovered that the majority of respondents were female, both in the intervention group and in the control group. The results of this study are corroborated by research conducted by Sulastri et al. (2012) which revealed that the gender characteristics of the majority of respondents are women. Sani, Ramadhani & Pitriani, (2019) discovered that hypertension in young women is relatively low, but that does not imply they are protected forever from hypertension when they are older, which is when they enter the age of 50, they have to begin to be more alert to the threat of this disease which is frequently understood as the silent killer. When women reach menopause, they begin to lose estrogen, resulting in a higher prevalence of hypertension in women between the ages of 45 and 55. Women who have not experienced menopause are protected by the hormone estrogen, which plays a pivotal role in boosting levels of High-Density Lipoprotein (HDL). High HDL levels are protective in the prevention of atherosclerosis. Women are also more likely to suffer from hypertension since they possess a higher risk of increasing their body mass index. Monthly cycle syndrome (premenstrual syndrome), post-menopause which generates the distribution of body fat is easy to accumulate due to the hormonal process (Larasiska, 2017). The results of Basic Health Research in 2013 unveiled that the prevalence of hypertension in Indonesia tends to be higher for women than men.

The level of education is one of the factors influencing a person's perception of being more receptive to latest ideas and technologies (Notoatmodjo, 2010). The results revealed that the majority of the respondents in the intervention group possessed an elementary education background. Meanwhile, in the control group, the majority of respondents are Junior High Schools. The results of this study are in accordance with research administered by Wijayanto & Satyabakti (2014) which illustrates that the majority of respondents' education is elementary school education. Similarly, the results of research by Pangestuti, Larasati & Vitani, (2022) elaborated that most of the respondents owned junior high school education, both in the intervention group and in the control group. The level of education possesses an influence on the incidence of hypertension, in which people who possess a high level of education will frequently possess a lot of knowledge about health and will have awareness in maintaining their health.

The study revealed that the intervention group's knowledge score about hypertension care increased by 1,066 points, with a p value of 0.022. It may be indicated that hypertension care education intervention through multimedia has a substantial effect on raising knowledge of hypertension patients. This finding is in accordance with the results of research by Sumah (2019) which elaborates that there is an effect of health education on a low salt diet on changes in knowledge of hypertension patients, with a p value of 0.001. Furthermore, the results of Mardhiah et al. (2015) research also asserted that there was an effect of health education on increasing respondents' knowledge with a p value of <0.05. Likewise, (Ulya et al., 2018) explained that there is an effect of health education on hypertension on increasing respondents' knowledge with a p value = 0.000, and in the control group, there is no significant effect with a p value = 0.194. Suratun et al., (2018) also elaborated in their research that there was a significant effect of the continuous nursing service approach intervention through health education about hypertension diet on escalating the knowledge score of respondents.

Knowledge is the consequence of a person's senses observing a thing. The intensity of attention and perception of the item is significantly affected by itself at the moment of sensing to develop knowledge. The senses of hearing and sight provide the majority of a person's knowledge. The intensity or amount of a person's understanding of objects varies. Knowledge is a crucial domain in the formulation of one's activities (Notoatmodjo, 2010). Increased knowledge is tremendously influenced by the factor of health workers who possess experience in providing good information in elaborating simply but easily understood by patients and administering adequate media considering that most hypertensive patients are in the elderly. Education about hypertension treatment and anti-stroke exercise in this study was performed in groups by employing videos and guide modules accompanied by exercises and discussions/questions and answers.

The results of the analysis revealed that there was an increase in the attitude score of hypertension sufferers about hypertension care in the intervention group by 2,033 with a p value of 0.001. It can be indicated that there is a significant effect of hypertension care education intervention through multimedia in enhancing the attitude of hypertension sufferers. This finding is in accordance with the research results obtained by Haryono, Krisanty & Manurung, (2018) who elaborated in their research that there was a significant effect of a sustainable nursing service approach through health education about hypertension diet on changes in the positive attitude of respondents with hypertension patients with a value of p = 0.000. Similarly, the results of Sabouhi et al., (2011) uncovered that there is a significant relationship between the attitudes of hypertension patients and efforts to control hypertension (p value = 0.001). Furthermore, Agustini, (2019) in his research also asserts that attitudes towards hypertension can influence the actions of a person (hypertension patients) to prevent hypertension. Attitude cannot be identified to be an action or activity, but it is a predisposition to the action of a behavior. Attitudes to individuals are not necessarily manifest in a real action,

attitudes cannot be directly identified, but can only be interpreted in advance of closed behavior (Notoatmodjo, 2010). As a result, attitude is one of the most influential variables on individual health values in order to effectively manage hypertension and prevent stroke. The results of this research demonstrate that if a person or respondent has a positive attitude, the hypertension therapy they receive is extremely effective. It is consistent with Green's theory, which claims that various factors, including attitude, have a major influence on health behavior.

The results of the analysis of the behavioral variables of patients performing hypertension treatment illustrated that there was a significant difference in the intervention group with p value = 0.008, the average difference in increasing foot exercise compliance in the intervention group was 0.600. It indicates that educational intervention on hypertension treatment in hypertension patients via multimedia has a substantial effect on hypertensive patients' behavior to organize hypertension. The results of this study are in accordance with the research result of Haryono et al. (2018) who elaborated in their research that with a p value of 0.000, the intervention of a sustainable nursing service strategy through health education regarding hypertension diet had a significant influence on changes in respondents' favorable attitudes. However, the results of this study are different from the research conducted by Suyoto, Agushybana & Suryoputro, (2020) which asserted that There was no difference in compliance between the intervention and control groups before and after receiving health education regarding hypertension diet ( $p \Rightarrow 0.05$ ). Behavior is robustly associated with compliance, which refers to the degree to which a patient follows the treatment and behavior recommendations of his doctor or others. Safitri, (2013) also demonstrates compliance which is also understood as adherence is the degree to which the patient follows the clinical advice of the treating doctor. In the medical context, the concept of compliance is a level that presents the patient's behavior in obeying or following procedures or medical expert advice. Nita, (2018) also illustrates that compliance is the extent to which the patient's behavior is in accordance with the provisions provided by health professionals. Adequate patient understanding regarding hypertension therapy enables patients to act in accordance with directives issued by authorized individuals such as doctors, nurses, and other health workers.

#### 4. CONCLUSION

Based on the results of the study, it is possible to conclude that multimedia-based education has an influence on enhancing hypertension patients' knowledge, attitudes, and behavior in stroke prevention. The recommended that the community can perform hypertension treatment independently frequently, and the implementation of the prolanis program can be enhanced so that people can receive services easily and regularly to prevent stroke.

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