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Smartphone-Based Self Management Education Improves Compliance and Self Efficacy and Reduces Blood Pressure in Hypertension Patients

Putu Wira Kusuma Putra[1]✉, Ni Nyoman Suardani[1], Ni Putu Eka Ariani[2], Ni Putu Ayu Suarsih[2]
[1]STIKES Bina Usada Bali, Indonesia
[2]Puskesmas Abiansemal I, Badung, Bali, Indonesia

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Abstract

Background: Obedience to medication and diet, self-efficacy and blood pressure stability are key factors for the success of hypertension treatment. Self management education is an alternative that can be done to increase the knowledge and self-care behavior of people with hypertension. The purpose of this study was to determine the effect of smartphone-based self-management education on self-efficacy, compliance and blood pressure of hypertensive patients.
Methods: This study uses a quasi-experimental approach with a nonequivalent approach with a control group design. The sample in this study was hypertensive patients aged 17-59 years, who had a smartphone and did not experience complications. A sample of 60 people was divided into two groups. The instruments used were self-efficacy questionnaire, 8-item Moriskys Medication Obedience Scale and a mercury sphygmomanometer. The data were analyzed using the Mann Whitney test.
Results: statistical test analysis showed that there were significant differences in obedience, self-efficacy, and blood pressure in patients with hypertension between the treatment group who received smartphone-based self-management education and the control group. (P value < 0.05). These results indicate that smartphone-based self-management education is effective in increasing compliance and self-efficacy and can reduce blood pressure in patients with hypertension
Conclusion: Providing health information by using a smartphone can have a positive impact on people's behavior, it is hoped that regular monitoring of the provision of health information by using smartphone media will increase the public's health status.

✉ Correspondence Address:
Email : Putuwirakusumaputra@gmail.com

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INTRODUCTION

Cardiovascular disease is a major health problem faced in various countries in the world. Hypertension is one of the most common cardiovascular diseases in the world. Hypertension is the number one cause of premature death in the world every year. Hypertension often does not show any symptoms for a long time and is often known as the silent killer (Kementerian Kesehatan Republik Indonesia, 2017).

Hypertension is an increase in blood pressure that exceeds the normal limit, based on the criteria of the Joint National Committee / JNC VIII (2014) aged 18 years, namely systolic 140 and diastolic 90 mmHg (Sagala, 2019). Hypertension has a high impact on various cardiovascular complications in the elderly such as heart failure and stroke The number of adults suffering from hypertension aged 30-79 years has increased very significantly from 659 million to 1.28 billion sufferers over the last 30 years. The World Health Organization (WHO) estimates that currently, the global prevalence of hypertension is 22% of the total world population. Southeast Asia is in the 3rd highest position with a prevalence of 25% of the total population (WHO, 2021). The results of the 2018 Basic Health Research (Riskesdas) showed the prevalence of hypertension in the population > 18 years based on national measurements was 34.11%, while the prevalence of hypertension in Bali was 30.97%. Badung Regency is one of the regencies in Bali where the population aged 15 years still suffers from hypertension. The Badung district health profile shows data that people with hypertension who received health services in Badung Regency in 2020 were 7,835 people (81.5%) of the estimated number of patients with 9,611 people (Kementerian Kesehatan Republik Indonesia, 2018).

Data from the Ministry of Health of the Republic of Indonesia, from the prevalence of hypertension of 34.1%, it is known that 8.8% are diagnosed with hypertension and 13.3% of people diagnosed with hypertension do not take medication and 32.3% do not routinely take medication. This shows that most people with hypertension do not know that they are hypertension so they do not get treatment. The reasons why people with hypertension do not take medication are because people with hypertension feel healthy (59.8%), irregularly visit health facilities (31.3%), take traditional medicine (14.5%), use other therapies (12.5%)), forget to take medicine (11.5%), unable to buy medicine (8.1%), there are drug side effects (4.5%), and hypertension medicine is not available in health care facilities (2%) (Kementerian Kesehatan Republik Indonesia, 2017). These data indicate that the problems faced by patients with hypertension are low obedience to treatment and the lack of self-confidence of patients with the treatment being carried out. The problem is influenced by many factors, one of which is knowledge. Knowledge about self-care can be increased by providing education or health information that is easily understood by the public.

Uncontrolled hypertension will cause various complications, especially target organ damage such as the risk of stroke, heart disease, kidney failure and even death. Handling hypertension can be done by implementing a healthy lifestyle. Changes in patient behavior are based on an understanding of knowledge, self-confidence (self-efficacy) and self-regulation abilities (self-regulation) independently or with the help of the family (Susanti et al., 2020). Efforts that have been made in the prevention and control of hypertension include increasing health promotion through the provision of educational information on controlling hypertension. One form of education that is commonly used and proven effective in improving clinical outcomes and quality of life for hypertensive patients is hypertension Self Management Education (HSME). Self-management education is a process of providing knowledge to patients about the application of self-care strategies independently to optimize blood pressure control, prevent complications, and improve the quality of life of hypertensive patients. The role of education can be done by utilizing various technological developments, one of which is by using a smartphone. The provision of this education is expected to cause changes in the behavior of hypertension sufferers in a better direction (Simanjuntak & Siregar, 2019). Several studies show that providing health information by using smartphones can increase knowledge, change

behavior and show a better clinical condition. Monitoring of health status can also be done by utilizing smartphone technology (Boels et al., 2019; de Jongh et al., 2012; Leon et al., 2015). The purpose of this study was to determine the effect of smartphone-based self-management education on compliance, self-efficacy, and blood pressure of hypertensive patients in the Abiansemal I Health Center Work Area.

METHODS

This research is a type of quantitative research with a quasi-experimental design. nonequivalent approach with a control group design in which the two sample groups in this study were measured before and after being treated (Notoatmodjo, 2010). The population in this study were hypertensive patients who were controlled at the Abiansemal 1 Health Center for December 2021 with a total of 93 people. Calculation of sample size using the Slovin formula with a sample size of 30 people for each group. The sampling technique in this study is a non-probability sampling purposive sampling type (Nursalam, 2011). The sample selection was carried out at the Abiansemal 1 Public Health Center Polyclinic by paying attention to medical records, looking at identity cards and asking for WhatsApp numbers that would be used to provide educational videos. The characteristics of the sample that can be included in the inclusion criteria in this study are hypertension sufferers aged 17-59 years and able to use smartphones, while the exclusion criteria include patients who experience complications, hypertensive patients who suffer from Covid and hypertension patients who are obese. Screening for exclusion criteria was carried out by looking at the patient's medical records, as well as the results of the rapid examination.

Data were collected using a self-efficacy questionnaire, the questionnaire has passed the validity and reliability test with an assessment of Croncbach Alpha = 0.83, to measure compliance the Morisky Medication Obedience Scales (MMAS) has been tested, this questionnaire has been tested for validity and reliability in Indonesia with internal consistency results moderate (Cronbach's =0.759) with good retest reliability (Spearman coefficient=0.860) (Vika et al., 2016) and measuring blood pressure using a sphygmomanometer and stethoscope.

The technical data collection was that respondents were divided into 2 groups, namely the control group who received standard therapy according to service procedures at the public health center and carried out normal activities, while the treatment group received education about self-management which was given every week for 1 month. This education is in the form of a video sent via WhatsApp on a smartphone owned by the respondent. This educational content contains the concept of hypertension in general, care, treatment and interactions with health workers. During the provision of education, the researcher followed up to ensure that the respondents watched the video by calling via WhatsApp and having discussions when there were things that were not understood. After one month, the blood pressure, compliance and self-efficacy of patients with hypertension will be measured again. The results of the data obtained will be analyzed using the Wilxocon test and the Mann Whitney test because the data is not normally distributed.

This research has been declared ethically feasible based on a decision letter from the Health Research Ethics Commission (KEPK) STIKES Bina Usada Bali number 084/EA/KEPK-BUB-2022.

RESULT AND DISCUSSION

Analysis of the Effect of Smartphone-Based Self Management Education on Compliance

Table 1. The results of the analysis of differences in treatment obedience of hypertension patients in the intervention group and the control group.

Group	Variable		N	Median (min-Max)	Mann-Whitney U	p value	Z
Intervention	Obedience	Pre test	15	6 (5-8)	53.500	0,011	-2.536
		Post test	15	7 (6-8)			
Control	obedience	Pre test	15	6 (5-8)			
		Post test	15	6 (5-8)			

The results of the Mann Whitney statistical test showed that there was a significant difference between obedience to medication for hypertension sufferers in the intervention group after receiving smartphone-based self-management education and the control group with a p value of 0.011 (<0.05). This shows that there is a significant effect of providing smartphone-based self-management education on increasing drug compliance in patients with hypertension.

Compliance or obedience is the degree to which the patient follows the clinical advice of the treating doctor. Compliance comes from the word obedient which means, one likes to obey orders, obey orders or rules and discipline. Obedience is doing something that is recommended or stipulated, compliance is simply an extension of individual behavior related to taking medication (Novian, 2014). Obedience to treatment is a key factor in the success of treatment for patients with hypertension. Obedience to treatment is also able to prevent complications due to hypertension such as stroke and other cardiovascular diseases (Erin Peacock, 2017). Many factors affect patient compliance with medication, one of which is information or knowledge related to the treatment. Factors that can increase compliance include an optimistic attitude, hope, broad insight, ability to control oneself in dealing with disease and in doing therapy (Leon et al., 2015).

This research is in line with the assessment conducted by (Indriastuti et al., 2021) who found that health education is effective in increasing the obedience of hypertension sufferers to the treatment therapy that is being carried out. This result is also in line with research conducted by (Kurnia, 2016) which examined the factors that influence compliance. It was found that health education is one of the influential factors in increasing compliance with hypertension sufferers. Smartphone-based health education is effective in increasing obedience in hypertensive patients. More interesting methods help patients absorb the information provided. The educational approach through smartphones can provide respondents with a broader understanding and can be seen many times. The provision of information that is carried out continuously will be able to increase knowledge very significantly. In addition, education through smartphones is more practical and can be read anywhere according to the circumstances. Health promotion is an effort to empower individuals, groups and communities to maintain, improve, and protect their health through increasing knowledge, willingness, and ability to behave in a clean and healthy life. By providing education using the right method, respondents will be encouraged to adhere to the treatment they are undergoing (Listiana et al., 2020). Several studies have shown that providing education about self-care is effective in increasing compliance with hypertension sufferers to take medication, and increasing knowledge about prevention, but it has not been effective in increasing blood pressure control compliance (Delavar et al., 2020; Zhang et al., 2021).

Analysis of the Influence of Smartphone-based Self Management Education on self-efficacy

Table 2. The results of the analysis of differences in self-efficacy in the intervention group and the control group.

Group	Variable	N		Median (min-Max)	Mann-Whitney U	p value	Z
Intervention	Self efficacy	Pre test	30	36 (27-50)	52.000	0,012	-2.520
		Post test	30	42 (36-56)			
Control	Self efficacy	Pre test	30	37 (26-52)			
		Post test	30	37 (28-53)			

The results of the Mann Whitney statistical test showed that there was a significant difference between self-efficacy in the intervention group after receiving smartphone-based self-management education and self-efficacy in the control group with a p value of 0.012 (<0.05). This shows that there is a significant effect of providing smartphone-based self-management education on increasing self-efficacy in patients with hypertension.

Self-efficacy in patients with hypertension is a patient's belief in acting and behaving following the expectations desired by patients and health workers. Self-efficacy can influence behavior change by influencing how a person thinks, motivates himself, and acts (Tan et al., 2021). Self-efficacy possessed by individuals will influence individuals to make decisions on their behavior. Self management education is an effort that nurses can do to provide ongoing education for clients with hypertension.

The results of this study are in line with research (Wang et al., 2017) Good knowledge will lead to positive perceptions so that they can carry out good coping mechanisms. The provision of health education can be done through various approaches, one of which is by using a smartphone. Health education with a smartphone approach has been shown to improve health status in chronic diseases (de Jongh et al., 2012; Haramiova et al., 2017; Varleta et al., 2017).

The process of forming self-efficacy is one of them from cognitive or knowledge. In this case, the actions taken by someone come from his mind and then these thoughts provide direction for the actions taken. If the higher the knowledge, level of education, and work that is owned will contribute to the formation of high self-efficacy, it cannot be separated from the existence of influencing factors such as previous individual experiences, and experiences of other people in the same way, social persuasion as well as physiological and emotional states (Dzerounian et al., 2022). Self management education is a form of structured health education that can be given to patients with hypertension which is a key element in increasing the self-efficacy of patients with hypertension and is needed to improve, control and carry out self-care. Self-efficacy is formed cannot be separated from the knowledge and sources of information obtained. Knowledge will lead to positive perceptions, impact attitudes and good coping mechanisms (Franek, 2013)

Self-management education is a set of techniques for changing behavior, thoughts, and feelings. Self-management education refers to the implementation and handling of one's life by using a learned skill. Self-management education can also avoid the concept of inhibition and control from the outside which is often associated with the concept of control and regulation

Analysis of the influence of Smartphone-based Self Management Education on Mean Arterial Pressure (MAP)

Table 3. The results of the analysis of differences in Mean Arterial Pressure in the intervention group and the control group.

Group	Variable		N	Median (min-Max)	Mann-Whitney U	p value	Z
Intervention	*Mean Arterial Pressure* (MAP)	Pre test	15	113 (100-123)	27.000	0,0001	-3.579
		Post test	15	110 (97-120)			
Control	*Mean Arterial Pressure* (MAP)	Pre test	15	113 (97-123)			
		Post test	15	110 (102-120)			

The results of the Mann Whitney U test statistic obtained data that the p value was 0.0001 (<0.05), indicating that there was a significant difference in the MAP value between the intervention group who received smartphone-based self-management education and the control group. This shows that there is a significant effect of providing smartphone-based self-management education on decreasing MAP values in patients with hypertension. This MAP value is an indicator to assess high and low blood pressure. Evaluation of high or low blood pressure measurements can also be known from calculating the MAP value or mean arterial pressure. This MAP is included in the normal category if the MAP calculation results range from 60-100 mmHg. If the MAP is more than 100 mmHg, it is said to be hypertension. The results of this study showed that the mean MAP in the intervention group after being given smartphone-based self-education was 103 mmHg, while in the control group the MAP was 111 mmHg. The success of providing self-management education is due to the interaction of the information provided with the recipient of the information provided

during the study. The smartphone program was developed with various features including Whatsapp as a reminder and also as a medium for educating hypertension patients regarding diseases, complications, management and prevention (de Jongh et al., 2012; Parker et al., 2018; Varleta et al., 2017) The use of smartphones in providing self-management education can improve blood pressure control, reduce blood pressure (systolic and diastolic), and can increase patient compliance in carrying out therapy (Penarrieta, 2015).

Self-management is an individual's ability to maintain effective behavior including following diet and exercise, use of prescribed drugs, self-monitoring and emotional coping. If all these components are carried out, it will be able to maintain blood pressure in a stable condition. Monitoring blood pressure is one of the routine things that must be done by people with hypertension. Many people with hypertension do not routinely control their blood pressure. Even though the risk of further complications from hypertension is very dangerous and even causes death (Lee & Park, 2017)

The results of this study indicate that there is a relationship between self-efficacy, compliance and blood pressure as measured by the MAP indicator. If people with hypertension have good self-confidence and self-efficacy towards self-care and have obedience to treatment, they tend to have stable blood pressure. Blood pressure is influenced by various factors, both physical and psychological. Obedience to treatment is one of the factors that can reduce and even stabilize blood pressure in people with hypertension. The results of field observations found that after being given smartphone-based education, hypertensive patients tended to be more active in asking questions when visiting health services. In addition, health information provided through this smartphone is disseminated by people with hypertension to their families and surrounding communities. This indicates that the provision of smartphone-based education has a very significant impact on the delivery of health information in the community.

CONCLUSION

The provision of smartphone-based self-management education is proven to be effective in increasing compliance and self-efficacy as well as being able to reduce blood pressure in patients with hypertension. Changes in behavior of obedience to self-care and self-confidence of patients with hypertension can not be separated from the increased knowledge of patients with hypertension after receiving education about self-care through smartphones. Providing health information using smartphones provides good benefits to people with hypertension, namely, information can be read many times and is easier to understand. It is necessary to carry out further monitoring of hypertension treatment by health workers by utilizing technological developments such as using smartphones so that the public's health status can be improved.

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