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RESEARCH

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The Effect of Blood Pressure Measurement Training on Early Detection and Control Efforts of Hypertension Patients in Health Service Facilities

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Abstract

Hypertension or high blood pressure is the result of systolic and diastolic blood pressure that is too high $\geq 140/90$ mmHg. Hypertension is one of the causes of premature death worldwide. Reducing the prevalence of hypertension by 33% in 2020-2030 is one of the global targets of non-communicable diseases. Blood pressure (BP) measurements performed by individuals and families have a high potential to improve the diagnosis and management of hypertension. The implementation of blood pressure measurements is carried out through increasing education and training for individuals and families in measuring blood pressure independently. Early detection through self-measurement of blood pressure and control of hypertension by health services is an effort to control hypertension. This study aimed to identify the effect of blood pressure measurement training on early detection and control efforts for hypertensive patients at health service facilities. This research uses a pre-experimental research design with a one-group pretest-posttest design. The sampling technique used a purposive sampling method, with a total sample of 24 respondents. The form of treatment is providing training to measure blood pressure using a digital blood pressure monitor. Before the training was conducted, the respondents' ability to measure BP was measured first through a pre-test (initial observation before the intervention), after which the intervention was given (BP measurement), then a post-test (final observation) was conducted after the treatment was given, using the same measuring instrument. The result of this study, there was an effect of blood pressure measurement training on early detection and control efforts of hypertension patients in health care facilities with a p-value of 0.000. Independent blood pressure measurement training in individuals with hypertension has a positive impact on increasing knowledge and changing individual behavior in conducting early detection and control efforts of hypertension in healthcare facilities.

Keywords: Blood Pressure, Measurement Training, Early Detection, Control Efforts, Hypertension.

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1. INTRODUCTION

Hypertension is a condition where systolic/diastolic blood pressure (BP) is too high $\geq 140/90$ mmHg. A person with hypertension may not realize/feel the symptoms, so it is often considered a silent killer and is one of the diseases that causes premature death throughout the world. One of the global targets of non-communicable diseases is to reduce the prevalence of hypertension by 33% in 2020-2030. Hypertension sufferers in the world are estimated to be 1.28 billion adults aged 30-79 years, most of whom live in low and middle-income countries. It is estimated that 46% of adults are not aware that they have hypertension. As many as 42% of adults are diagnosed with hypertension, and around 1 in 5 adults (21%) have managed to control their hypertension (Fatima & Mahmood, 2021; World Health Organization, 2023).

The prevalence of hypertension in Indonesia (2018) is 34.11% with the prevalence of hypertension in women (36.85%) higher than in men (31.34%). Prevalence of hypertension in urban areas is slightly higher (34.43%) compared to rural areas (33.72%). The prevalence increases with age (Kementerian Kesehatan Republik Indonesia, 2020). The number of hypertensive sufferers in East Nusa Tenggara Province in 2018 amounted to 27.7% (Badan Pusat Statistik, 2023). The prevalence of hypertension cases in East Sumba Regency (data from the East Sumba Health Service, 2023), is 43.453 cases (2020), 42.831 cases (2021), and 41.604 cases (2022). There were 770 cases of hypertension in the Waingapu Community Health Center Work Area (2020), 811 cases (2021), and 679 cases (2022) (Badan Pusat Statistik, 2023).

Early detection of hypertension sufferers is an effort to control hypertension through early case discovery, which has an impact on the management of these cases. This is included in efforts to overcome non-communicable diseases (PTM) through activities to prevent and control diseases such as hypertension. Health promotion activities, early detection and special protection to change risk factors that cause hypertension such as changing lifestyle, physical activity, diet patterns, and others are also efforts to overcome NCDs (Astuti et al., 2021; Kementerian Kesehatan Republik Indonesia, 2022). The government, through BPJS, has organized Prolanis for early detection of diseases that occur in the community, however, the results of researchers' observations of this activity found that not all activities were carried out in this activity. In line with the results of research conducted by (Nisa, 2022) which shows that the implementation of PROLANIS in Community Health Centers has not been effective and has not achieved the objectives of PROLANIS, it is known that only 4 activities have been carried out of 6 activities that should be implemented by Community Health Centers according to the PROLANIS guidebook. In line with the research results (Widianingtyas et al., 2020), the patient's self-efficacy level is still low.

Hypertension patient control to health service facilities is necessary in efforts to control hypertension. Increase community efforts to achieve access to first-level health services, such as Community Health Centers, to always carry out routine BP measurements. Other efforts include early detection, monitoring of causal factors, and the risk of increasing cases of hypertension (Astuti et al., 2021).

BP measurement training as an early detection and control effort for hypertensive patients in health service facilities is very important to implement. Blood pressure measurements carried out by individuals/families have a high potential to improve the diagnosis and management of hypertension. The implementation of BP measurement practices is carried out through increased education and training to empower individuals, families, cadres, and the community to measure BP independently. Training programs according to clinical standards are recommended to carry out BP measurements, early detection, and routine screening for hypertension in health services and in the community. Monitoring BP through measurements carried out at home is an alternative if the individual/family has independently measured BP and if outpatient monitoring is not available/not optimally used (González et al., 2020; Muntner et al., 2019; Shimbo et al., 2020). The results of observations on families of patients with hypertension found that the families were able to carry out BP measurements independently

but had not maximally paid attention to all the correct positions when taking measurements. In line with the results of research conducted by (Khasanah et al., 2020) it was stated that there was a difference in systolic blood pressure (SBP) between sitting and standing positions and standing and lying down, and there was a difference in diastolic blood pressure (DBP) between lying and sitting positions, and sitting and standing. The results of research conducted by (Arwani, & Sunarno, 2007) stated that there was a significant difference between the results of blood pressure measurements carried out on the right arm and the left arm in people with hypertension. Seeing this problem, it is important to conduct training on how to measure BP correctly with the right position to get more accurate results.

Hypertension is one of the non-communicable diseases with a high incidence rate, including in the Waingapu Health Center Working Area, East Sumba Regency. Based on initial data, many hypertension patients are not detected early due to a lack of understanding and skills in measuring blood pressure independently. In addition, patient compliance in carrying out routine checks at health facilities is still low, which risks increasing complications of hypertension. The main causes of this problem include lack of education for patients and families about the importance of routine blood pressure measurements for early detection. Lack of skills in measuring blood pressure correctly, so that the results obtained are inaccurate or ignored. Lack of patient awareness of the importance of routine checks at health care facilities, which causes delays in handling hypertension.

This research aims to identify the effect of blood pressure measurement training on early detection and control efforts for hypertensive patients in healthcare facilities. The Benefits of Blood Pressure Measurement Training in This Research is to improving participants' skills in measuring blood pressure correctly, to increasing patient and family awareness of the importance of early detection of hypertension, to increasing patient compliance in carrying out hypertension control to health facilities, to evaluating the effect of training on changes in participant behavior in detecting hypertension early and carrying out routine controls.

2. RESEARCH METHOD

The method in this study used a pre-experimental research design with a one-group (pre-test-post-test design). This study conducted a pre-test before being given treatment (initial observation before intervention), after which intervention was carried out, then a post-test (final observation) was carried out after treatment was given, using a measuring instrument in this study, blood pressure measurement training will be carried out, before the treatment was carried out a pre-test will be carried out to see the knowledge, ability and respondents in measuring BP. After the treatment, a post-test will be carried out. The supporting tool used in this study is a digital blood pressure monitor, because according to the results of research Zuhdi et al., (2020) it is said that measurements using a digital sphygmomanometer are more accurate, so the use of this type of sphygmomanometer is highly recommended for clinical measurements in hospitals and health clinics.

The population in this study were families who had family members with hypertension totaling 679 families in the Waingapu Health Center Working Area, East Sumba Regency. The sample type used is Non-Random (Non-Probability sampling). The sampling technique uses a purposive sampling method. The sample size used in this research uses the Slovin formula, with a total sample of 24 respondents. Determining the sample size in this study used the Slovin formula, which is expressed as:

$$n = \frac{N}{1+N(e^2)}$$

Where:

n = Sample Size

N= Population Size (679 families)

$E = \text{Margin of Error } 20\% (0.2)$

From the calculation results, the number of samples obtained was 24 respondents. The use of purposive sampling in this study also supports the selection of a relatively small number of samples, because: Purposive sampling is a non-random technique that selects samples based on certain criteria that are considered relevant by the researcher. The sample size of 24 respondents used in this research is statistically in accordance with the Slovin formula using a margin of error of 20%. The use of a 20% error rate in this study is based on several relevant methodological considerations. First, the limited number of participants so that the selection of a looser significance level is needed so that the analysis can still be carried out optimally. Second, this study has an exploratory character, considering the limited number of studies that specifically examine the effect of BP measurement training on hypertension control behavior in primary care facilities. In the context of an exploratory study, a higher error rate is still considered reasonable, as an initial step to open up space for further research. Third, considering the small sample, the use of a 20% error rate helps maintain the strength of the statistical test (statistical power), so that the potential for significant influence is not overlooked. In addition, the selection of purposive sampling also supports the selection of smaller samples because it is focused on respondent criteria. According to Sugiyono (Sugiyono, 2019), for simple quasi-experimental research the sample size is 10 – 20 people. The inclusion criteria in this research were people who had family members or sufferers of hypertension and were willing to become respondents by signing a letter of consent to become respondents. The research time is planned for May 2024, for one (1) month. Primary data is data taken directly from respondents, using observation sheets before the training, during the training, and after the training has been carried out and an evaluation has been carried out. Secondary data is data obtained from several related agencies, such as hypertension control records and reports related to hypertension cases.

This study began with a literature study, curriculum review, and the results of researchers' observations of hypertension problems, then compiled an approach and instrument aimed at improving efforts to control and early detection of hypertension through training in self-measurement of blood pressure by patients and families. In this study, blood pressure measurement training was conducted, before treatment a pre-test would be conducted to see the respondents' knowledge and ability in measuring BP, after treatment a post-test would be conducted. The instrument used was an observation sheet that had been designed to measure knowledge, skills, and behavior in controlling hypertension comprehensively. To measure the effectiveness of the training, pretest and posttest were conducted twice, namely the first pretest was conducted before the training began to measure the respondents' initial knowledge and skills related to BP measurement and early detection of hypertension. The second pretest was conducted 7 days after the training was completed to determine the retention of understanding and the respondents' abilities after being given time to apply the training material in daily practice. The posttest was also conducted simultaneously with the second pretest as part of the final evaluation. All pretest and posttest questions used validated instruments, covering aspects of technical knowledge, practical skills, and procedural understanding. After all research data was collected, data analysis was carried out, obtained results, made discussions and conclusions adjusted to the objectives of this study. The instrument in this study used an observation sheet to see the initial abilities of respondents before training in blood pressure measurements. After training, researchers used the same observation sheet to see the final abilities of respondents after being given training in measuring blood pressure.

Data analysis used in this research was the Wilcoxon matched pairs test. Collecting data on Early Detection and Control Efforts of Hypertension Patients to Health Service Facilities before training is carried out. Data regarding blood pressure measurements before blood pressure measurement training (Pre-Test) is X_a , data regarding treatment in the form of blood pressure measurement training is X , and data regarding measurements after treatment is X_b .

The ethical principles in this research (Yusuf et al., 2017) are Respect for human dignity (respecting human dignity), Beneficence (doing good) and non-maleficence (not causing harm), and Justice (fairness). This research has received ethical approval from the KEPK Poltekkes Kemenkes Kupang with number No. LB.02.03/1/0075/2024.

3. RESULTS AND DISCUSSION

Respondents selected according to the inclusion criteria are families who have family members or sufferers of hypertension and are willing to become respondents by signing a letter of consent to become respondents.

Table 1. Characteristics of respondents according to gender, Age, Level of education, and Job

Gender	Frequency (n)	Percentage (%)
Male	11	46
Female	13	54
Total	24	100
Age		
31 – 40	2	8
41 – 50	10	42
>50	12	50
Total	24	100
Education		
Didn't graduate from elementary school	4	17
Graduated from elementary school	5	21
Graduated from middle school	2	8
Graduated from vocational school/high school	13	54
Total	24	100
Job		
Housewife	8	34
Farmer	12	50
Retired ASN	2	8
Doesn't work	2	8
Total	24	100

Table 1 shows that the characteristics of the respondents in this study are a total of 24 respondents. The number of male respondents was 11 people (46%), and female respondents was 13 people (54%). The number of respondents aged 31-40 years was 2 people (8%), aged 41-50 years was 10 people (42%), and aged > 50 years was 12 people (50%). Respondent characteristics based on education were respondents who did not graduate from elementary school were 4 people (17%), respondents who graduated from elementary school were 5 people (21%), respondents who graduated from junior high school were 2 people (8%), and respondents who graduated from vocational school/high school were 13 people (54%). characteristics of respondents based on type of work, namely 8 respondents working as housewives (34%), 12 people farmers (50%), 2 ASN retirees (8%), and 2 people not working (8%).

Table 2. Descriptive Test of Pre-Test and Post-Test of Knowledge

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Pre-Test	24	4.88	0.850	3	7
Post-Test	24	9.50	0.590	8	10

Table 2 shows that the number of respondents (N) was 24 people with an average (mean) score for the pre-test of 4.88, while for the post-test it was 9.50, where the post-test score was greater than the pre-test score. This can be seen. This means that there was an increase in knowledge about hypertension and blood pressure measuring equipment among respondents after being given research treatment. Std Value deviation on the pretest was 0.850 and on the posttest it was 0.590. The minimum score obtained on the pre-test is 3, while on the post-test it is 8. Meanwhile, the maximum score on the pre-test is 7, and the highest score on the post-test is 10.

Table 3. Descriptive Test of Pre-Test and Post-Test Behaviour

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Pre-Test	24	2.83	1.239	0	5
Post-Test	24	9.71	0.464	9	10

Table 3 shows that the number of respondents (N) was 24 people with a mean (Mean) score for the pretest of 2.83, while for the posttest it was 9.71, where the posttest score was greater than the pretest score. This can be interpreted as an increase in ability. respondents in measuring blood pressure using a blood pressure meter after being given research treatment. Std Value Deviation on the pre-test was 1.239, and on the post-test was 0.464. The minimum score obtained on the pretest is 0, while on the post-test it is 9. Meanwhile, the maximum score on the pre-test is 8, and the highest score on the post-test is 10.

Table 4. Wilcoxon Test of Knowledge and Behavioural

Knowledge		N	Mean Rank	Sum of Ranks	Z	p-Value
Post test – Pre test	Negative Ranks	0	.00	.00	-4.371	.000
	Positive Ranks	24	12.50	300.00		
	Ties	0				
	Total	24				
Behavioral		N	Mean Rank	Sum of Ranks	Z	p-Value
Post-test – Pre-test	Negative Ranks	0	.00	.00	-4.355	.000
	Positive Ranks	24	12.50	300.00		
	Ties	0				
	Total	24				

Table 4 shows that the Negative Ranks value is 0, which means that there is no decrease in the respondent's knowledge and behavioral value in the post-test. The Positive Ranks value is 24, which means that 24 respondents (all respondents) experienced an increase in their knowledge score in the post-test or after being given training on measuring blood pressure using a blood pressure meter. These results are statistically significant, where the p-value is 0.000, where the p-value is <0.05 , which means that there is an influence of blood pressure measurement training on knowledge and behavior of early detection and efforts to control hypertension patients at health service facilities.

DISCUSSION

Based on the research results, there is an influence of blood pressure measurement training on early detection and control efforts of hypertensive patients to health service facilities, which is indicated by the results of measuring the knowledge and behavior of respondents after the training has increased. Hypertension self-detection training activities have been proven to be effective in increasing community health independence (Myrtha et al., 2024;

Setyawati & Atmojo, 2022). Blood pressure measurement training can improve individual knowledge and behavior to monitor self-measured blood pressure, which has high potential to improve the diagnosis and management of hypertension and its prevention (Asri et al., 2020; Riskiyah & Rachmawati, 2021; Shimbo et al., 2020). In addition, this training can improve individual knowledge and motivation in implementing a healthy life and checking health regularly so that early detection efforts are achieved for a disease suffered by an individual (Rianty & Mariadi, 2023; Yuliana & Djoar, 2024). It is very important to measure blood pressure to prevent an increase in prevalence, control blood pressure and prevent complications (Sa'adah & Nisak, 2021; Restawan et al., 2024).

Training to measure blood pressure independently provides education to patients and families about the general concept of hypertension, including risk factors and the consequences if not controlled properly (Shimbo et al., 2020). This knowledge is important to increase awareness and individual responsibility in managing health conditions. Knowledge about hypertension as the silent killer must be emphasized to patients and families that this disease is often asymptomatic so that early detection efforts can prevent complications from worsening this disease. Self-measuring blood pressure is one of the efforts to raise awareness of early detection of hypertension (Padwal et al., 2019).

Blood pressure measurement training encourages behavioral change and increased individual knowledge and abilities (Santoso & Sudarsih, 2021), where patients and families begin to make blood pressure measurement part of their daily routine. This training improves the technical skills of patients and families in carrying out accurate blood pressure measurements. These skills enable individuals and families to independently monitor health and provide appropriate data to health workers. This is an important step in early detection of hypertension, keeping blood pressure within normal limits and preventing the development of other complications (Kario, 2020; Lukitaningtyas & Cahyono, 2023). This training is one of the anticipatory efforts and strategies for controlling blood pressure at home. Increasing knowledge and ability to measure blood pressure independently in the daily routine of individuals and families has an impact on creating well-controlled hypertension and changes in health behavior as well as public awareness of utilizing the nearest health service facilities (Eltrikanawati & Gultom, 2024; Marni et al., 2022).

The impact of independent blood pressure measurement training is to increase knowledge and change the behavior of patients and families towards being more proactive in accessing health services when there is a significant change in blood pressure measurement results. This shows a change in behavior that is more responsible and aware of the importance of early detection, control efforts and timely medical treatment (Myrtha et al., 2024). The knowledge gained from training improves lifestyle changes to reduce the risk of non-communicable diseases and patient compliance with medical recommendations such as following drug prescriptions, diet, and other lifestyle changes recommended by health professionals (Myrtha et al., 2024; Wahyuni et al., 2019). The training model used is a Short Theory Session and Focus by providing a brief understanding of the importance of early detection of hypertension, blood pressure measurement standards, and decision-making to bring hypertensive families to health services. Direct Simulation (Hands-On Practice): Providing direct practice training in measuring BP using standard tools (digital tensiometers), with instructor guidance, and simulation of cases of hypertensive patients. Real-Time Feedback: Each participant is given direct feedback during practice, to correct blood pressure measurement techniques.

Family involvement in this training provides more support in the process of managing hypertension, better understanding how to help patients, including motivating them to take regular blood pressure measurements and undergo treatment. Increasing family knowledge and skills in recognizing and anticipating symptoms of hypertension (Dolifah et al., 2023; Fitriah et al., 2021). This training can change the attitude of patients and families towards the

importance of managing health independently, being responsible and being more active in maintaining health, which is reflected in the increase in frequency and seriousness in monitoring blood pressure. Understanding the risk of complications that can occur due to uncontrolled hypertension increases patient and family awareness so that they are more motivated to carry out regular blood pressure measurements and follow control efforts recommended by health workers. Independent blood pressure training increases the self-confidence and skills of the community, family and patients in managing hypertension conditions independently at home, maintaining and seeking health assistance when needed at the nearest health service facility (Marpaung et al., 2022).

The limitation of this research is that the type of research method only uses one treatment group so the results of this research will likely be different if there is another control group. Long-term effects of training may not be apparent within the limited duration of the study.

4. CONCLUSION

There is an influence of independent blood pressure measurement training on the knowledge and behavior of early detection and control efforts of hypertension patients to health care facilities with a p-value of 0.000. This research shows that training for independent blood pressure measurement in individuals with hypertension has a positive impact on increasing individual knowledge and behavior in carrying out early detection and efforts to control hypertension at health service facilities. Increasing knowledge has an impact on increasing individual awareness of early detection and control efforts, changing behavior to routinely control blood pressure and preventing further complications, increasing compliance with antihypertensive treatment and healthy lifestyle changes, and facilitating early detection of changes in blood pressure.

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