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Application of anti-hypertension exercises on blood pressure changes as a prevention strategy for emergency hypertension

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Abstract One of the emergency complications that usually occurs is hypertension. Physical exercise, such as Anti-Hypertension Exercises, is one of the efforts needed to control blood pressure and reduce the risk of complications. This program aims to improve community understanding and skills in controlling blood pressure through activity training (anti-hypertension exercises) to prevent hypertension-related emergencies. A health education method that provided education, demonstration, and practice of Anti-Hypertension Exercises together was carried out with 48 people with hypertension in the Kebagusan area, Pasar Minggu, Jakarta. The results of the activity showed an increase in public knowledge and attitudes about preventing hypertension emergencies through Anti-Hypertension Exercises and changes in blood pressure, both systolic, diastolic, and MAP, before and after the activity. It is hoped that Anti-Hypertension Exercises activities can be carried out consistently so that blood pressure can be controlled and reduce the risk of complications of hypertension emergencies.

Abstrak *Hipertensi adalah kondisi medis serius yang signifikan meningkatkan angka mortalitas penderitanya. Salah satu komplikasi kegawatdaruratan yang biasanya terjadi adalah hipertensi emergensi. Latihan fisik berupa senam hipertensi menjadi salah satu upaya yang perlu dilakukan untuk mengontrol tekanan darah dan menurunkan risiko komplikasi yang dapat terjadi. Program ini bertujuan untuk meningkatkan pemahaman dan kemampuan masyarakat dalam mengontrol tekanan darah melalui latihan aktivitas (senam hipertensi) sebagai bentuk pencegahan terjadinya hipertensi emergensi. Metode pendidikan kesehatan dengan pendekatan pemberian edukasi, demonstrasi dan praktik senam hipertensi bersama yang dilakukan kepada pada 48 orang penderita hipertensi di wilayah Kebagusan, Pasar Minggu, Jakarta. Hasil kegiatan menunjukkan peningkatan pengetahuan dan sikap masyarakat tentang pencegahan hipertensi emergensi melalui senam hipertensi serta terjadi perubahan tekanan darah baik sistolik, diastolik dan MAP sebelum dan setelah kegiatan. Diharapkan kegiatan senam hipertensi dapat dilakukan secara konsisten agar tekanan darah dapat terkontrol dan menurunkan risiko terjadinya komplikasi hipertensi emergensi.*

Keywords: blood pressure; hypertensive emergency; hypertensive exercise; physical exercise; prevention strategies

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INTRODUCTION

Increasing life expectancy contributes to the increase in population. It is predicted that in 2030 the world's elderly population will reach 1.4 billion, and in Indonesia, which is predicted to reach 61 million by 2050. In addition to having a positive impact, this condition can also have a negative impact if it is not balanced with an increase in the welfare of the elderly, such as the threat of health problems. Elderly with hypertension obtained poor quality of life, compared to the elderly who have normal blood pressure (Tina *et al.*, 2021). Hypertension is the most common disease suffered by adults. Hypertension can cause someone to die with complaints and without complaints because this disease is often referred to as a silent killer. Hypertension can be prevented and controlled in value if the patient carries out pharmacological therapy (by taking blood pressure lowering drugs) and non-pharmacological such as doing physical activity (Wahyudi *et al.*, 2022).

Hypertension is a serious medical condition that significantly increases the risk of heart, brain, kidney and other diseases and even causes premature death. An estimated 1.4 billion people in the world have high blood pressure disease, but only 14% have it under control. The majority of people with hypertension are in low- and middle-income countries, including Indonesia (World Health Organization, 2023). World Health Organization (2021) assesses that hypertension has caused 7.5 million deaths or 12.8% of total annual deaths. About one billion people in the world suffer from hypertension. Hypertension causes eight million deaths every year, of which nearly 1.5 million are in Southeast Asia.

The national prevalence of hypertension based on Riskesdas data in 2018 was 34.1%. The figure decreased slightly to 33.34% for DKI Jakarta and 29.93% for South Jakarta. Although this figure is quite high. It is estimated that 46% of people with hypertension are unaware of their condition and only 21% of people with hypertension control their blood pressure (Badan Penelitian dan Pengembangan Kesehatan, 2019). This can lead to hypertension emergencies known as hypertensive emergencies. Emergency hypertension is characterized by an acute increase in blood pressure (systolic pressure greater than 200 mmHg and/or diastolic blood pressure greater than 120 mmHg) that is also associated with the presence or absence of organ dysfunction (Benken, 2018).

Proper and appropriate management of hypertension is required. It is proven that physical activity and/or exercise can delay the onset of hypertension. Regular exercise has the potential to lower blood pressure by 5 mmHg overall. Systolic blood pressure drops by 5 mmHg, which reduces mortality from coronary artery disease by 9%, mortality from cerebrovascular accidents by 14%, and overall mortality by 7%. Everyone, including those with normal, pre-hypertension, and hypertension, should be encouraged to exercise regularly (Tjahjono *et al.*, 2023)

Prevention and control of hypertension can be done with regular exercise or physical activity including walking, cycling, swimming, doing homework and anti-hypertension exercises. Anti-hypertensive exercise is part of physical activity that can reduce body weight and relieve stress, which are the two highest risk factors for hypertension (Neng *et al.*, 2020). Research by Hayes *et al.* (2022) provides evidence of synergy between physical activity and pharmacotherapy for the treatment of hypertension, providing an opportunity for health professionals to promote physical activity as an adjunctive treatment for hypertension as well as a prevention strategy. Supported by a study conducted by Musa (2021) that hypertension can be prevented through physical activity and maintaining a balanced diet.

The results of the initial study through interviews with local residents, it was found that there had never been health education activities about Anti-Hypertension Exercises as a safe physical exercise to reduce blood pressure. Therefore, the team is interested in conducting community service in this area, with the aim of increasing health rates and awareness for each individual regarding the importance of maintaining health.

METHOD OF IMPLEMENTATION

The method applied in this community service is direct health education with an approach of providing education, demonstration and practice regarding Anti-Hypertension Exercises as a strategy to control blood pressure to prevent emergency hypertension. Participants who are determined as program targets are hypertensive patients (at least 5 years old) aged over 45 years who volunteer to participate in activities and live in the RW 08 area, Pasar Minggu, Kebagusan Village, South Jakarta.

Preparations made by the team were identifying and discussing with community leaders and local cadres related to the root of health problems, environmental characteristics to community needs for the formulated program; determining appropriate methods and techniques for organizing activities; preparing technical needs (infrastructure, preparation of educational media and demonstrations, and evaluation instruments needed); and carrying out licensing with related parties.

The activity was carried out in collaboration between lecturers and students of the Nursing Study Program FIKES UPN "Veteran" Jakarta class XIX with all community leaders and health cadres in the community service location. The description of the implementation of the community service program begins with initial data collection (questionnaire and blood pressure) for 20 minutes; Providing education and question and answer regarding emergency hypertension and Anti-Hypertension Exercises for 20 minutes; Demonstration and practice of Anti-Hypertension Exercises for 45 minutes; Taking evaluation data (questionnaire and blood pressure) for 20 minutes.

Monitoring and evaluation of service activities is carried out through filling out digital questionnaires using the google-form platform and observation sheets for cumulative blood pressure check results before and after (pre- and post-test) hypertension exercise practices and the success of practical activities carried out. The questionnaire was determined by the service team and content testing was carried out regarding the readability and difficulty level of questions tailored to participants. The questionnaire contains questions regarding data on participants' knowledge and attitudes related to the activity objectives. Questions on knowledge indicators use a Guttman scale, while attitude indicators use a Likert scale.

As a follow-up, the results of data collection were then processed using univariate analysis to assess the frequency distribution of the measured variables, and bivariate analysis to assess the success of the activities carried out based on the measured variables. In addition to quantitative analysis, monitoring and evaluation activities were also carried out on the aspects of assessing the enthusiasm of participants, the suitability of following the movements during practice, the success of repeating the information and practical movements taught.

RESULTS AND TARGET ACHIEVEMENT

Participants who successfully participated in the community service program from the beginning to the end of the activity were 48 people with hypertension in the Kebagusan village area, South Jakarta. The series of community service activities that have been carried out are described as follows:

1. Preparation

The implementation team has completed a series of activity preparations such as coordinating and licensing, preparing evaluation instruments (questionnaires and observation sheets), preparing facilities and infrastructure, disseminating information to target participants, and agreeing to carry out activities scheduled according to the monthly activity schedule at the place of service. In addition to these preparations, preparations were also made on the day of the activity, including preparing the venue and ensuring its readiness for use, holding technical briefings (Figure 1a), and registering and checking the health of participants (Figure 1b) before the activity began. Based on this, no significant obstacles were found both during the planning of the activity and the preparation for the implementation of the activity.



(a)



(b)

Figure 1. Series of program implementation preparation; (a) team briefing, (b) registration, health check and pre-test instrument filling

2. Implementation of community service programs

The series of events began with registration, health checks, filling out pre-test forms until the participants gathered at the agreed place. The activity began with a series of opening (Figure 2a), followed by the core event, namely the provision of education (the concept of emergency hypertension and anti-hypertension exercises) (Figure 2b), demonstration and practice of exercises for 45 minutes in accordance with the established Standard Operating Procedures (Figure 2c). The activity ended with evaluation (evaluation questionnaire, (Figure 3b) and blood pressure measurement, Figure 3c) until closing.

3. Monitoring and evaluation

Monitoring and evaluation were carried out simultaneously in the implementation of the program with the results, participants had high enthusiasm as evidenced by the accuracy of attendance in accordance with the agreed contract and the number of participants participating in the program held. Participants showed positive activities in supporting the sustainability of the program as evidenced by high enthusiasm, active participation in question-and-answer sessions and practice of hypertension exercises, to be able to follow the program with a low dropout rate. Qualitatively, as a result of monitoring and evaluation of the implementation of

exercises practice, participants were assessed to be able to follow all movements and repeat the movements that had been demonstrated before with accuracy (Figure 3a).



(a) (b)

(c)

Figure 2. Series of program implementation; (a) opening, (b) providing education and Q&A, (c) demonstration and practice of anti-hypertension exercises



(a) (b)

(c)

Figure 3. (a) Evaluation of practice success, (b) post-test completion, and (c) blood pressure checking

The results of quantitative data processing from pre and post test data collection activities using the specified instruments, ultimately produce activity outputs in the form of results data described as follows:

1. Participant knowledge

Table 1. Participants' knowledge of anti-hypertension exercises before and after educational activities and implementation of anti-hypertension exercises

Knowledge Level	Before Program		After Program	
	f	%	*f*	%
Not good (<55%)	1	2,1%	0	0%
Good Enough (56-74%)	8	16,7%	0	0%
Good (>75%)	39	81,3%	48	100%
Total	48	100%	48	100%

Table 1 shows that participants' knowledge is spread across three categories (not good, good enough, and good). The data in the table shows that the majority of participants' knowledge before the activity was carried out was in the good knowledge category, as many as 39 participants (81.3%). After the hypertension exercise, all 48 participants (100%) had good knowledge.

Health education can increase the knowledge of the target and the gymnastic activities carried out can be carried out routinely by the target to prevent an increase in blood pressure (Wahyudi *et al.*, 2022). Health education is an action that can affect respondents' behavior, one of which is a change in knowledge. With the provision of health education, respondents will get learning that makes changes from not knowing and understanding to knowing and understanding (Riza *et al.*, 2022). In line with research conducted by Istiqomah *et al.* (2022) showed an increase in elderly knowledge by 14.22% after hypertension knowledge education in Jombang Regency. Marbun and Hutapea (2022) on hypertensive patients who seek treatment at the primary health care, found that as many as 18 people increased their knowledge by 95%.

The results of research by Rahmawati *et al.* (2020) also showed an increase in elderly knowledge after emergency hypertension education with indicators of definition (82.1%), signs and symptoms (52%) and treatment (45%). The importance of emergency hypertension education is one of them to prevent death when an emergency hypertension attack occurs. This increase in knowledge can reduce the risk of death in the community due to an emergency hypertension attack, because they understand what to do (Rahmawati *et al.*, 2020).

If individuals have good knowledge about health, they will consider the impact of all the activities they do. Likewise with people with hypertension, if the patient has good knowledge, it can make it easier to lower blood pressure or avoid rising blood pressure (Atiqa *et al.*, 2023). An increase in knowledge also indicates an increase in one's awareness of risk factors. There are risk factors for hypertension that cannot be changed such as age, gender and heredity/genetics, there are also risk factors that can be changed such as obesity, smoking, lack of physical activity, excessive salt consumption, dyslipidemia, alcohol consumption and psychosocial and stress (Ekarini *et al.*, 2020).

2. Participant Attitude

Table 2 shows that before the activity was carried out, there were 37 participants who had a poor attitude (77.1%) and only 2 participants had a good attitude (4.1%). This shows that

participants are predominantly unfavorable in responding to emergency hypertension. However, after the activity, the participants' attitudes changed to be dominant in the good attitude category, as many as 35 people (72.9%) and as many as 13 participants (27.1%) had a fairly good attitude.

Table 2. Participants' attitudes about anti-hypertension exercises before and after educational activities and implementation of anti-hypertension exercises

Participant Attitude	Before Program		After Program	
	f	*%*	*f*	*%*
Poor (<55%)	37	77,1%	0	0%
Fairly Good (56-74%)	9	18,8%	13	27,1%
Good (>75%)	2	4,1%	35	72,9%
Total	48	100%	48	100%

Attitude is the most important concept in social life which is closely related to character building within individuals and between groups (Shalahuddin *et al.*, 2021). If knowledge increases, the attitude will also increase. However, good knowledge is not accompanied by an attitude, so that knowledge will be meaningless (Priyadarsani *et al.*, 2021). The better the patient's attitude towards their hypertension, the greater the patient's awareness to control their blood pressure (Atiqa *et al.*, 2023).

In line with the research of Jayadi *et al.* (2021) which shows that hypertension counseling using leaflet media has a positive effect on improving participants' attitudes, showing a significance value of p = 0.000 (p < 0.05). The results of this study are in line with research conducted by Haryani *et al.* (2016) which shows that hypertension counseling has an effect on hypertension attitudes p = 0.014. Furthermore, research by Wijayanto and Satyabakti (2014) also stated that most hypertensive patients with good knowledge were not accompanied by a supportive attitude.

3. Blood pressure indicator

Table 3. Information on changes in blood pressure of participants before and after anti-hypertension exercises activities

Blood Pressure Indicator	Mean	SD	Paired			*t*	*Sig*
			Delta Mean	95% CI Lower	95% CI Upper		
Systolic blood pressure[*)]							
Before Intervention	130.27	16.224	0.771	-2.569	4.110	0.464	0.645
After the intervention	129.50	10.927					
Diastolic blood pressure*)							
Before Intervention	80.13	11.555	-1.833	-4.466	0.799	-1.401	0.168
After the intervention	81.96	10.705					
Mean Arterial Pressure[**)]							
Before Intervention	96.81	11.321	-0.771	-3.317	1.776	-0.609	0.545
After the intervention	97.58	8.737					

Table 3 shows that there were changes in average blood pressure in participants, both systolic blood pressure and diastolic blood pressure. The average value of systolic blood pressure decreased, which was originally 130.27 mmHg, decreased to 129.50 mmHg. While the average value of the participants' diastolic blood pressure increased from 80.13 mmHg to 81.96 mmHg. The results of the participants' MAP pressure also increased from a mean value of 96.81 mmHg to 97.58 mmHg. So, it is concluded that there is a change in the average blood pressure before and after the intervention of Anti-Hypertension Exercises which leads to the standard of normal blood pressure values.

In line with the research of Rahmawati and Imamah (2024) which states a decrease in blood pressure before and after the intervention of hypertensive exercises on clients, namely a decrease in systolic blood pressure by 11-15 mmHg, and a decrease in diastolic blood pressure by 4-7 mmHg. In addition, it is supported by Atiqa's *et al.* (2023) study which shows that there is an effect of Anti-Hypertension Exercises on changes in blood pressure in hypertensive elderly patients both for systole scores and for diastole scores. That the comparison of the results of systole and diastole can be concluded there is an effect of Anti-Hypertension Exercises on lowering blood pressure in hypertensive elderly people in Kebon Pedes, Bogor City.

Wahyuni *et al.* (2023) explained, arterial blood vessels will experience dilation and become stiff as a person ages. This results in reduced blood capacity and recoil. The more reduced the blood vessels, the systolic pressure will increase which causes a person to experience hypertension. Efliani *et al.* (2022) describe exercise that is done regularly and regularly can reduce blood pressure. By exercising, the walls of blood vessels will become stronger, elastic, and widen in the arterioles so that the number of capillaries will increase and cause blood circulation to be smooth and blood pressure within normal limits.

Study Hubaybah *et al.* (2023) also explained during exercise, the oxygen demand in the cells will increase for energy generation, resulting in an increase in heart rate. This results in an increase in cardiac output and valve contents. Thus, blood pressure will increase. After resting the blood vessels dilate, and the blood flow will temporarily decrease, about 30-120 minutes later it will return to the pre-exercise blood pressure. If you exercise regularly and continuously, the decrease in blood pressure will last longer and the blood vessels will be more elastic.

Anti-Hypertension Exercises is a physical activity that can be done where special gymnastic movements for hypertensive patients are carried out for 30 minutes with stages of 5 minutes of warm-up exercises, 20 minutes of transitional movements, and 5 minutes of cooling movements with a frequency of 4 times in 2 weeks regularly can lower blood pressure, reduce the risk of stroke, heart attack, kidney failure, heart failure, and other vascular diseases Hernawan and Rosyid (2017). Study Tina *et al.* (2021) explain that hypertension care by adding hypertension exercise activities regularly combined with other treatments can maximize care for people with hypertension in improving life welfare and preventing complications.

CONCLUSIONS

Anti-Hypertension Exercises have been proven to be able to reduce blood pressure among adults to the elderly. This is a good step as a form of prevention and to reduce the risk of hypertension emergencies if done regularly. The simple movements of Anti-Hypertension Exercises make this physical activity suitable for people at the adult to elderly age levels. Doing Anti-Hypertension Exercises is also a practical relaxation technique because it can be done anytime and anywhere.

It is expected that Anti-Hypertension Exercises can be done regularly to get maximum results. Anti-Hypertension Exercises are also suitable to be a routine agenda in the community as a form of health maintenance in reducing the risk of hypertension prevalence, especially among adults and the elderly. In addition, this activity can also be modified in the form of a collaboration program between local health institutions, such as organizing Anti-Hypertension

Exercises as well as blood pressure screening. Thus, the community can be more concerned about their health.

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