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Prevention of Hypertension through the Use of Homemade Herbs and Supplements

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A B S T R A C T

Globally, approximately 1.28 billion individuals are affected by hypertension, a Non-Communicable Disease (NCD) that represents the second leading risk factor for premature death. Hypertension raises the risk of cardiovascular disease, a global health challenge. Hypertension can result from a lack of information on the disease. Hypertension can be controlled and prevented at the community level through education, the introduction of antihypertensive plants, and training in herbal supplements. To improve public health in West Martapura, counseling and training sessions were held with the PKK. Visual media, leaflets, and demonstrations were used. The mean posttest scores for knowledge about hypertension prevention and control, knowledge of herbal plants with antihypertensive properties, and knowledge and skills in making health supplements from herbal plants were 90.5, 89.0, and 84.5, respectively.

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INTRODUCTION

Globally, approximately 1.28 billion individuals are affected by hypertension, a Non-Communicable Disease (NCD) that represents the second leading risk factor for premature death (Nurmalika et al., 2024; Salipian & Usviany, 2023). Hypertension is defined as an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg on two measurements with an interval of five minutes in a state of rest (Zubaidah et al., 2024). Some of the factors that can contribute to the development of hypertension include lifestyle habits, dietary patterns, and psychological stress. Persistent elevation of blood pressure can result in damage to vital organs, including the kidneys, heart, and brain. This is particularly concerning given the lack of adequate treatment and control rates for high blood pressure, particularly in low- and middle-income countries (Hermawati et al., 2024).

Hypertension can be prevented and controlled through self-management education, including education for sufferers, self-monitoring of clinical measurements (Tursina et al., 2022), and lifestyle modifications (e.g., healthy diet, physical activity, weight loss, smoking cessation and avoidance of cigarette smoke, and abstinence from alcohol consumption) (Zubaidah et al., 2024) and support for medication adherence have been widely utilized for the management of elevated blood pressure (Wicaksono & Lestari, 2024). As indicated in the South Kalimantan health profile for 2022, the prevalence of hypertension in Banjar Regency was 90.3%, representing the second highest rate after Hulu Sungai Tengah Regency. The three most prevalent diseases in the Martapura Barat subdistrict were hypertension (102 cases), acute upper respiratory infections (83 cases), and non-insulin dependent diabetes mellitus (62). The remaining diseases identified included other conditions. A significant proportion of patients with hypertension have uncontrolled blood pressure, with this figure continuing to rise. The rise in the number of individuals diagnosed with hypertension is not solely attributable to individual negligence. It can also be attributed, at least in part, to public ignorance, which may result from a lack of information about the disease. The lack of knowledge about hypertension among health workers, patients, and the general public is a primary contributor to uncontrolled blood pressure, particularly among hypertensive patients (Rahmawati et al., 2024; Yulandasari et al., 2023). It is imperative that all stakeholders, including medical professionals with diverse hypertension specializations, government representatives, private sector entities, academics, and the general public, collaborate to effectively control hypertension (Zubaidah et al., 2024).

Community-based chronic disease control represents a common intervention effort in the management of diseases, including hypertension and other cardiovascular diseases. The strategic objective is to collaborate with the PKK mobilization team of Martapura Barat subdistrict as an intermediary/partner in the activity. This is due to the fact that the prevalence of hypertension in the Martapura Barat subdistrict is relatively high. The PKK mobilization team serves as an exemplar of a change agent, facilitating community mobilization through the implementation of PKK programs. The PKK team plays a pivotal role in facilitating community engagement, raising

awareness, and controlling programs to enhance the quality of human resources in the community. In accordance with Article 5, Paragraph 2 of Law Number 1 of 2013 concerning the PKK Movement, it is evident that the PKK oversees a total of 10 programs, one of which is dedicated to health and healthy planning. This includes initiatives to prevent and control hypertension in families. Martapura Barat subdistrict is one of the subdistricts that continues to rely on the involvement of the PKK to mobilize community participation and awareness in maintaining a healthy lifestyle, from the immediate family unit to the general public, in order to prevent and control the increase in hypertension sufferers in the area.

Hypertension can be prevented through periodic blood pressure monitoring, lifestyle modifications, pharmacological therapy, and non-pharmacological interventions (Mugna et al., 2023). Non-pharmacological therapy represents an alternative treatment option. One of the non-pharmacological treatments for hypertension is complementary therapy. One of the complementary therapies that may be beneficial for individuals with hypertension is herbal therapy. Herbal plants are a common treatment for hypertension. One such plant is garlic, which has been shown to have beneficial effects in studies (Alfaini et al., 2023). However, consuming garlic directly may result in an unpleasant taste. Therefore, it is necessary to process the substance in question without reducing its beneficial properties, for example, by fermenting it into black garlic. The consumption of black garlic has been demonstrated to result in a reduction in blood pressure (Mutaqqin et al., 2023). Based on information obtained by the community service team from the chairman and members of the TP PKK of Martapura Barat Subdistrict, it has been established that counseling on hypertension has been received from health center officers. However, with regard to the self-management of hypertension prevention and control and knowledge of herbal plants in the surrounding environment that have been proven to reduce high blood pressure, the majority of TP PKK members have never received any form of assistance. Furthermore, the making of health supplements, particularly black garlic, has never been a topic of discussion. In this case, it is imperative that academics engage in the resolution of community health issues by disseminating scientific and technological knowledge in alignment with the objectives of IKU5 in higher education and by extending support to one of the five strategic government initiatives pertaining to health independence. The objective of the activity is threefold: firstly, to enhance the participants' understanding of hypertension self-management; secondly, to provide insight into the potential of herbal plants as antihypertensives; and thirdly, to offer guidance on the production of health supplements from herbal plants, with a focus on black garlic.

IMPLEMENTATION AND METHODS

Eight lecturers and three students from Lambung Mangkurat University's Faculty of Medicine and Health Sciences took part in the community service event. The participants and partners included the PKK team of West Martapura subdistrict, representing 13 villages, as well as the subdistrict team itself. The community service event was held at the Hall of West Martapura Subdistrict, Banjar Regency on Monday, August 12, 2024, from 9:00 a.m. to 12:30 p.m., and was attended by approximately 42 administrators and PKK members of West Martapura Subdistrict. The stages of implementing community service activities begin with giving a pre-test to participants of community service activities related to hypertension self-management, antihypertensive plants, and making fermented garlic, then giving leaflets. The material delivery session covered hypertension self-management, antihypertensive plants, and fermented garlic as a health supplement for hypertension prevention. During the presentation, participants in community service activities can ask questions to clarify points of confusion. Community service activities will include distributing questionnaire sheets and handing over tools and materials for making fermented garlic to each PKK team in each village and the central PKK team of the Martapura Barat subdistrict. This will facilitate the production of these products by the community.

RESULTS AND DISCUSSION

The service activity comprises counseling, education, and training, which are evaluated through the administration of a pre-test and post-test. An illustration of the counseling activities is provided in Figure 1.

Figure 1. Providing Information on the Introduction and Utilization of Antihypertensive Plants

Evaluation results can be seen in table 1

Tabel.1 Percentage of Question Topics Answered Correctly in Pre and Post-Test

No	Question Topics	Mean *Pre-test*	Mean *Post-Test*
1.	Self-management of hypertension prevention and control	71.0%	90.5%
2.	Introduction and utilization of herbal plants for hypertension control and prevention	73.6%	89.0%
3.	How to process *black garlic* as a health supplement for the prevention and control of hypertension	61.4%	84.5%

Table 1 shows that after education and training, including self-management, the introduction and utilization of plants, and the preparation of fermented garlic for hypertension control and prevention, partners' average post-test score exceeds 80%. The normality test of partner knowledge score data was conducted using the Shapiro-Wilk normality test (data <50) prior to the pre- and post-test difference test.

Tabel 2. Normality Test

Content	Section	Frequency Distribution	Sig. Test Value	Description
1.	*Pre-Test*	42	0.00	Not normal
	Pos-test	42	0.00	Not normal
2.	*Pre-Test*	42	0.00	Not normal
	Pos-test	42	0.00	Not normal
3.	*Pre-Test*	42	0.00	Not normal
	Pos-test	42	0.00	Not normal

Normality tests for materials 1, 2, and 3 showed that the data were not normally distributed ($p \leq 0.05$). The Wilcoxon test was used to assess the difference between the two groups. The Wilcoxon test showed there's a statistically significant difference in partner knowledge before and after the material was distributed (p-value = 0.000). Partners who received training in hypertension control and prevention can now disseminate information in their villages to reduce hypertension incidence.

The prevention and control of hypertension can be achieved through the implementation of self-management education, which encompasses the education of sufferers, the monitoring of clinical measurements by the individual, and the modification of lifestyle habits (e.g., the adoption of a healthy diet, regular physical activity, weight loss, smoking cessation, avoidance of cigarette smoke, and the reduction or elimination of alcohol consumption). Additionally, the provision of support for medication adherence has been demonstrated to be an effective strategy for the management of high blood pressure. A comprehensive understanding of hypertension can enhance an

individual's motivation to engage in self-care practices. As evidenced by the research conducted by Zubaidah et al., (2024) , there is a notable correlation between an individual's knowledge and their lifestyle choices, and the subsequent incidence of hypertension. An enhanced understanding of hypertension among patients will facilitate the development of more beneficial health behaviors, which in turn will positively impact blood pressure management. An individual's lifestyle is a significant contributing factor to the prevalence of disease. Smoking is one of the factors that contribute to an elevation in blood pressure. The frequency of cigarette consumption is positively correlated with the incidence of hypertension. This phenomenon can be attributed to the fact that the CO gas produced by cigarette smoke has the potential to exert a significant influence on the elevation of blood pressure. Similarly, a lack of physical activity elevates the risk of hypertension, as it can precipitate an increase in body weight. Those who are physically inactive tend to have a higher heart rate, necessitating greater exertion by the heart muscles with each contraction. This is corroborated by the findings of the research conducted by Hermawati et al, (2024), which demonstrated a statistically significant correlation between smoking habits and physical activity with the prevalence of hypertension. Another study demonstrated that the number of hypertensive patients who are unaware of the disease process and the means of managing it is significantly correlated with the efficacy of self-management of hypertension control and prevention. Those who engage in self-management tend to exhibit positive behaviors, including maintaining a healthy diet, monitoring their blood pressure when eating, reducing salt intake, consistently monitoring their blood pressure, and recognizing the signs and symptoms of hypertension (Wicaksono & Lestari, 2024).

The introduction and utilisation of antihypertensive medicinal plants in the PKK Team of Martapura Barat Subdistrict has led to an increase in knowledge regarding the benefits of several antihypertensive plants. Direct education on the introduction and utilization of medicinal plants is an effective method for increasing public knowledge about their types and uses (Yulandasari et al., 2023). A plethora of traditional medicinal plants are utilized as a form of hypertension therapy, with a decoction of soursop leaves, celery, bay leaves, ginger, basil leaves, moringa leaves, and garlic representing a particularly notable example. It is believed that the potassium ions present in soursop leaves may contribute to a reduction in blood pressure. The presence of potassium ions in extracellular fluid has been demonstrated to induce relaxation of the heart muscle and a reduction in heart rate. Additionally, potassium ions regulate the balance of body fluids with sodium, inhibit renin release, play a role in arteriolar vasodilation, and reduce the endogenous vasocontriction response, thereby lowering blood pressure. This is demonstrated by the impact of administering a soursop leaf decoction on reducing blood pressure in elderly individuals with hypertension(Rahmawati et al., 2024). It has been demonstrated that celery leaves possess the ability to reduce blood pressure. This is believed to be attributed to the bioactive content of apigenin and phtalides, which have the potential to relax arterial muscles or relax blood vessels. Furthermore, these compounds have the

potential to dilate directional vessels and reduce blood pressure (Aisyah & Mulya, 2023). Bay leaves have been demonstrated to exert a beneficial effect on the kidneys, facilitating the removal of excess fluid and salt from the body. Bay leaves contain potassium and alkaloids, which may contribute to their ability to lower blood pressure (Alfaini et al., 2023; Mugna et al., 2023). Another plant that has been demonstrated to possess hypotensive properties is garlic. The consumption of garlic in a steeping solution has been demonstrated to effectively reduce elevated blood pressure levels in individuals diagnosed with hypertension. The components of garlic that exert a direct effect on calcium ions, thereby influencing the contraction of cardiac muscle and blood vessels. These components can inhibit the entry of calcium ions into the cell, which results in a decrease in the intracellular calcium ion concentration and a subsequent reduction in membrane potential, leading to muscle relaxation. This relaxation results in vasodilation of the blood vessels, thereby facilitating smooth blood circulation and a reduction in blood pressure. Additionally, garlic contains potassium, which plays a role in maintaining equilibrium in blood pressure. Potassium is an intracellular electrolyte that is essential for maintaining fluid balance, osmotic pressure, acid-base balance, and the sodium pump mechanism, which is crucial for regulating blood pressure. Consequently, potassium deficiency can lead to elevated blood pressure and other cardiovascular complications. Therefore, maintaining adequate potassium levels is vital for stabilizing blood pressure (Mutaqqin et al., 2023).

In this PkM activity, the methodology for garlic fermentation was also elucidated. The process of garlic fermentation has been shown to reduce the languor of garlic, prolong its shelf life, and enhance its flavor. While ordinary garlic has a distinctive spicy, sharp, and aromatic profile that may not be universally appealing, the fermentation process can impart a sweeter taste and a more palatable quality to the garlic (Banne et al., 2024). With regard to its impact, the antioxidant profile of fermented garlic is more pronounced than that of its unfermented counterpart, rendering it a more optimal antihypertensive agent. The compounds present in fermented garlic include S-allyl cysteine (SAC), flavonoids, allicin, and hydrogen sulfide. Allicin has been demonstrated to inhibit the activity of angiotensin II, while flavonoids and hydrogen sulfide have been shown to dilate blood vessels, thereby regulating blood pressure and reducing hypertension (Harahap et al., 2021).

Following a 15-day monitoring period, the evaluation of the activities was conducted. The success of the training was evidenced by the production of fermented garlic products by the PKK teams of the 13 villages. The results are presented in Figure 2 and 3.

Figure 2. Teams from the Women's Movement (PKK) Produce Fermented Garlic in Each Village

Figure 3. The Production of Fermented Garlic By the West Martapura Women's Movement is Complete in 6-10 Days

CONCLUSIONS AND RECOMMENDATIONS

The service activity was conducted in an effective and satisfactory manner. The participants evinced considerable enthusiasm for the service, as evidenced by the notable increase in their knowledge. In addition to the educational component, the participants were instructed in the process of garlic fermentation. The mean posttest scores for the knowledge assessment regarding self-management of hypertension prevention and control were 90.5, for the knowledge of herbal plants with potential antihypertensive properties, 89.0, and for the posttest value of knowledge and skills in preparing health supplements from herbal plants in the form of fermented garlic, 84.5.

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