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The Effect of Celery Leaf Decoction (Apium Graveolens) on Lowering Blood Pressure in Elderly Hypertensive Patients

Nuraini[1]*, Sunarmi[2], Hendri Tamara Yuda[3], Armi[4], & Neng Annis Fathia[5]
[1]*Universitas Muhammadiyah Tangerang, Indonesia, [2]Universitas 'Aisyiyah Palembang, Indonesia, [3]Universitas Muhammadiyah Gombong, Indonesia, [4]STIKes Mitra Keluarga, Indonesia, [5]Universitas 'Aisyiyah Palembang, Indonesia
*Co e-mail: anney.passolong@gmail.com[1]

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ABSTRACT

Hypertension is a major risk factor for cardiovascular disease, with increasing prevalence globally and nationally. Alternative treatments such as celery leaves (Apium graveolens), which contain active compounds with antihypertensive effects through vasodilation and diuretic mechanisms, are being explored. Purpose: This study aimed to determine the effect of celery leaf decoction on systolic and diastolic blood pressure reduction in elderly individuals with hypertension. Methods: A quasi-experimental pretest-posttest design was used on 30 elderly patients with mild to moderate hypertension in RW III Anduring, Padang (2025). Participants consumed 250 mg of celery leaf decoction twice daily for 14 days. Data were analyzed using a paired t-test with a significance level of $p < 0.05$. Results: The average systolic blood pressure decreased from 147.6 mmHg to 133.4 mmHg ($p = 0.000$). The diastolic pressure dropped from 92.3 mmHg to 85.1 mmHg ($p = 0.001$), indicating a statistically significant effect. Conclusion: Celery leaf decoction effectively lowers blood pressure in elderly hypertensive patients and may serve as a complementary therapy to reduce reliance on antihypertensive drugs. Implications: Health workers, especially at Puskesmas, are encouraged to educate communities on the potential of herbal remedies like celery leaf as part of integrative hypertension management.

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INTRODUCTION

Hypertension, or high blood pressure, remains a global health problem with a significant impact on morbidity and mortality, especially among the elderly. According to the latest WHO fact sheet published on March 16, 2023, an estimated 1.28 billion adults aged 30–79 years worldwide have hypertension, with two-thirds living in low- and middle-income countries. However, only 46% are aware of their condition, 42% receive treatment, and just 21% have their blood pressure under control (WHO, 2023).In Indonesia, based on the SKI 2023 (Indonesian Health Survey 2023), Ministry of Health of the Republic of Indonesia. As cited in Katadata: "Indonesia's Hypertension Prevalence to Drop to 30.8% in 2023", the prevalence of hypertension in the population of 18 years of age reached 30.8% based on blood pressure measurements, while based on a doctor's diagnosis was only 8.6%, indicating a large gap in public awareness. Some provinces with the highest prevalence include Central Kalimantan (40.7%), South Kalimantan (35.8%), and West Java (34.4%). Hypertension is known as the 'silent killer' because it often shows no obvious symptoms but can cause serious complications such as stroke, heart failure, kidney disease, and visual impairment, so early detection, lifestyle management, and public education are very important to suppress its long-term effects.

Treatment of hypertension generally involves long-term pharmacological therapy that must be done regularly, such as ACE inhibitors, beta-blockers, diuretics, and calcium channel blockers. Although effective, long-term use of these drugs often causes side effects such as fatigue, impaired renal function, and sleep disturbances due to suppression of melatonin production, especially in lipophilic beta-blocker drugs such as metoprolol (Wali et al., 2023).

This encourages people to seek alternative or complementary therapies based on natural ingredients that are considered to have a lighter risk of side effects. One plant that has potential as a herbal therapy for hypertension is celery (Apium graveolens). Celery leaves have long been used in folk medicine and are known to have diuretic, antioxidant and antihypertensive effects. Active compounds such as 3-n-butylphthalide, apigenin, flavonoids, and potassium in IT function to dilate blood vessels, decrease peripheral vascular resistance, and increase urinary excretion of sodium and water. Recent clinical research by Ghodsian et al. (2022) showed that celery seed extract significantly lowered systolic and diastolic blood pressure without causing serious side effects.

Various studies have been conducted to prove the effectiveness of celery leaves in lowering blood pressure. Recent research by Farshid et al. (2022) published in the Journal of Dietary Supplements reported that the administration of celery seed extract capsules as much as 1.34 grams per day for 4 weeks successfully reduced systolic and diastolic blood pressure significantly in mild to moderate hypertensive patients. Systolic blood pressure dropped from 141.2 mmHg to 130.0 mmHg and diastolic pressure from 92.2 mmHg to 84.2 mmHg, without any significant side effects. Research conducted by Aisyah et al. (2023) found that consumption of celery leaf decoction as much as 250 ml per day for 30 days can significantly reduce systolic, diastolic, and mean blood pressure in hypertensive patients.

In addition, celery leaves also have additional benefits such as lowering cholesterol levels, reducing inflammation, and improving kidney function—all contributing to overall blood pressure control. Recent experimental studies have shown that consumption of celery leaf decoction significantly lowers systolic, diastolic, and mean arterial pressure (MAP) blood pressure, while lowering cholesterol levels after one month of use (Febriza et al., 2024). Another Mechanistic review also highlighted the role of active compounds such as flavonoids and phthalide in suppressing pro-inflammatory cytokines as well as improving lipid profiles and vascular function (Alobaidi & Saleh, 2024). This plant is relatively safe, cheap, and easy to obtain, so it has great potential as an applicative complementary therapy in the community.

Although the results of this study indicate the potential of celery leaf extract in lowering blood pressure, the findings are preliminary and limited by the small sample size, short duration of intervention, and variations in the extraction methods used. These limitations open up space for more comprehensive follow-up studies to test the effectiveness, optimal dosage, and safety of celery leaf extract in the long term. Given the plant's potential as an inexpensive, natural, and accessible herbal therapy, further research with a more rigorous experimental approach is critical to producing scientific evidence that can be integrated into clinical practice as well as Community-Based Complementary Medicine programs.

Based on this, the researchers conducted a study entitled 'The Effect of Celery Leaf (Apium graveolens) Decoction on Lowering Blood Pressure in Hypertension Patients' with the hope of contributing to the development of complementary therapies that are natural, safe, and affordable in the management of hypertension, especially in the elderly.

METHODS

This study is a type of quasi-experiment with pretest-posttest design without a control group. The study was conducted in RW III Anduring, Padang. The population in this study was the elderly suffering from mild to moderate hypertension. The sample was deliberately selected as many as 30 people who meet the inclusion criteria, such as 60-80 years old, are not taking antihypertensive drugs, and are willing to follow the study for 14 days. The Data were analyzed using paired t-tests to determine significant differences between blood pressure values before and after administration of celery leaf decoction. Monitoring is carried out every three days to ensure compliance with consumption and monitor any side effects.

This design can be described as follows:

Table 1. One Group Pretest–Posttest Research Design

Pretest	Treatment	Posttest
O1	X	O2

Description:

O1 : Measurement Blood pressure measurement of the elderly before treatment

X : Treatment

O2 : Measurement Blood pressure measurement of the elderly after treatment

RESULTS

This study involved 30 elderly people with hypertension an age range of 60 to 80 years. The majority of respondents had a history of hypertension for more than 1 year. Blood pressure measurements were taken before (pretest) and after (posttest) the intervention for 14 days. The results of blood pressure measurements are presented in the following table:

1. Characteristics of Respondents Based on Gender

Table 2. Characteristics of Respondents Based on Gender

No	Gender	f	%
1.	Male	13	43
2.	Female	17	57
	Total	30	100

The results in table 1 show that 43% of respondents were male and 57% were female.

2. Characteristics of Respondents Based on Family History of Hypertension

Table 3. Characteristics of Respondents Based on Family History of Hypertension

No	Family History	f	%
1.	Yes	21	70
2.	No	9	30
	Total	30	100

The results in Table 2 showed that the majority of respondents, which amounted to 70%, had a family history of hypertension, while only 30% of respondents came from families without a history of hypertension.

3. Effect of Giving Celery Leaf Decoction Water to Patients with Hypertension

Table 4 Results of Statistical Analysis of Blood Pressure Before and After Giving Celery Leaf Decoction to Patients with Hypertension (n = 30)

Parameter	Mean Before (mmHg)	Mean After (mmHg)	SD	Mean Difference	t-value	p-value
Systolic Blood Pressure	147,6	133,4	7,25	14,2	8,97	0,000

Parameter	Mean Before (mmHg)	Mean After (mmHg)	SD	Mean Difference	t-value	p-value
Diastolic Blood Pressure	92,3	85,1	5,60	7,2	6,45	0,001

The table above showed that the average systolic blood pressure of respondents before the intervention was 147.6 mmHg, which then decreased to 133.4 mmHg after 14 days of celery leaf decoction, with a statistical p value of 0.000 ($p < 0.05$). Meanwhile, diastolic blood pressure also showed a decrease from an average of 92.3 mmHg to 85.1 mmHg, with a statistical p value of 0.001 ($p < 0.05$). The p value which is smaller than 0.05 in both parameters indicates that the decrease in blood pressure that occurs is statistically significant where celery leaf decoction has an effect on reducing systolic and diastolic blood pressure, especially in the elderly.

DISCUSSION

1. Characteristics of Respondents Based on Gender

Based on the results of the study, it was found that of the total elderly respondents, 43% were male, while 57% were female. This difference in numbers reflects the global trend of the elderly population, where the number of women tends to be more than men. This is closely related to the higher life expectancy of women compared to men. According to the World Health Organization (2022), women have an average global life expectancy of about 5 years higher than men. This is due to a number of factors, including health behaviors, hormonal influences, and lower mortality from heart disease at a young age in women.

Based on the results of the study, a higher proportion of female respondents gives an important idea of the group most susceptible to hypertension in old age. Study by Peters et al. (2021) confirmed that postmenopausal women have an increased risk of hypertension due to a decrease in the hormone estrogen, which plays a role in vasodilation, causing an increase in blood pressure. These conditions corroborate our finding that non-pharmacological interventions, such as celery leaf steeping, are particularly relevant to apply to this group, given the herb's effectiveness in lowering blood pressure reported in various studies (Sharma et al., 2023).

In addition, intervention approaches that utilize social support and community-based health education are also critical to improving treatment adherence and success. The Social Control theory elaborated by Umberson and Montez (2019) explains that social involvement can reinforce healthy behaviors, especially in elderly women. Therefore, the integration of celery leaf steeping in health programs in puskesmas or posyandu elderly, with the support of the social environment, has the potential to improve therapeutic outcomes and quality of life of hypertensive patients (Kumar et al., 2022). This study aims to analyze the effectiveness of celery leaf steeping as a safe and widely applicable adjunctive therapy in the elderly female community.

However, we also recognize that although this study did not specifically compare the effectiveness of celery leaf steeping by gender, it is still important to consider the physiological

differences between men and women, including the metabolism of active substances and the body's response to herbal interventions. Therefore, in future studies, it is recommended to conduct a more in-depth analysis of effectiveness by gender to gain a more comprehensive understanding.

Celery leaf tea itself has been known to have pharmacological effects that support blood pressure reduction through the content of phthalides, flavonoids, and other natural diuretic compounds. These compounds work by relaxing blood vessel walls and increasing sodium and water excretion, helping to control blood pressure naturally (Houston, 2005; Adedapo et al., 2012).

Considering the high prevalence of hypertension in elderly women and their tendency to follow alternative medicine programs, celery leaf steeping may be an effective, safe, and acceptable adjunctive therapy option.

2. Characteristics of Respondents Based on Family History of Hypertension

The results showed that 70% of respondents had a family history of hypertension, while the remaining 30% did not have such a history. This finding indicates that most of the hypertensive elderly in this study have a genetic background or hereditary factors that contribute to their hypertension condition.

Family history of hypertension is recognized as a major risk factor that cannot be modified. Genetic factors can affect blood pressure regulation mechanisms, such as the renin-angiotensin-aldosterone system, sympathetic nerve activity, and sensitivity to salt and stress (Carretero & Oparil, 2000). Individuals who have a parent or sibling with hypertension are more at risk of experiencing a gradual or progressive increase in blood pressure with age (Carey et al., 2018).

As a medicinal plant, celery (Apium graveolens) contains active compounds such as phthalides, which can help relax smooth muscles in the walls of blood vessels and increase blood flow, thereby lowering blood pressure naturally (Houston, 2005). The diuretic effect of celery leaves also helps reduce fluid volume in the body and blood pressure, as evidenced by the research of Adedapo et al. (2012). Therefore, in the elderly group with a family history of hypertension, celery leaf steeping has the potential to be a safe and affordable intervention for managing blood pressure holistically, especially when combined with healthy lifestyle settings (Sharma et al., 2023; Kumar et al., 2022).

According to the researchers' analysis, the high proportion of respondents with a family history of hypertension suggests that herbal-based interventions, such as celery leaf steeping, are highly relevant to be investigated as an alternative or supporting treatment in high-risk groups. Although family history is a fixed risk factor, its negative impact can be minimized through preventive and promotive approaches. The use of natural ingredients such as celery can be used as part of a hypertension control strategy, especially among the elderly who are more susceptible to the side effects of chemical drugs and have a preference for natural therapies.

3. Effect of Giving Celery Leaf Decoction Water to Patients with Hypertension

Based on the results of the study, it was known that the administration of celery leaf steeping for 14 days has a significant effect on lowering blood pressure in the elderly with hypertension. The average systolic blood pressure of respondents before the intervention amounted to 147.6 mmHg decreased to 133.4 mmHg after the intervention. Similarly, diastolic blood pressure decreased from 92.3 mmHg to 85.1 mmHg. Statistical tests showed a p value of 0.000 for systolic blood pressure and 0.001 for diastolic blood pressure ($p < 0.05$), indicating that the reduction in both blood pressure parameters was statistically significant. Thus, celery leaf steeping is proven to have an effect on reducing blood pressure, both systolic and diastolic, in elderly people with hypertension.

This decrease in blood pressure can be explained scientifically through the content of active compounds in celery leaves, including 3-n-butylphthalide (NBP), apigenin, and other flavonoid compounds. NBP is known to have vasodilator abilities that can help dilate blood vessels and reduce peripheral pressure, so that blood pressure can decrease naturally. In addition, apigenin has an inhibitory effect on calcium channels and can relax vascular smooth muscle. Some studies have also shown that celery has a diuretic effect, which helps increase sodium and water excretion, thereby lowering blood volume and overall blood pressure (Li et al., 2019; Tsi & Tan, 2021).

These findings are in line with previous research conducted by Moghadam et al. (2022), in which celery seed extract consumed for 4 weeks successfully reduced systolic blood pressure by 11 mmHg and diastolic blood pressure by 8 mmHg significantly. In Indonesia, a similar study was conducted by Widyaningsih (2023) who found that giving celery leaf brew for one week was able to significantly reduce blood pressure in the elderly. The consistency of these results suggests that celery, in the form of a decoction or extract, has potential as a complementary therapy in the management of hypertension, especially in the elderly.

The researchers' analysis shows that the considerable reduction in blood pressure in a relatively short time (14 days) is a meaningful finding, considering that herbal therapies generally take longer to show clinical effects. Other factors that support the effectiveness of this intervention are the simplicity of presentation, low cost, and ease of obtaining celery leaves as a natural ingredient that is widely available in the community. In addition, the absence of side effects during the use of celery leaf steeping makes it a safe therapy for short-term use (Patel et al., 2022). This is in line with research by Li et al. (2023), which shows that herbal remedies that are easily accessible and have a good safety profile are essential to improve patient compliance, especially among the elderly who are susceptible to polypharmacy and drug side effects.

In terms of age, the elderly are more susceptible to increased blood pressure due to changes in blood vessel elasticity and decreased kidney function (Smith & Johnson, 2021). Therefore, a safe and easily available natural intervention such as celery leaf decoction is a good option to help control blood pressure without increasing the burden of drug consumption. However, the effectiveness of celery leaf decoction can be influenced by factors such as diet, physical activity, stress levels, and the use of antihypertensive drugs (Garcia et al., 2022). Thus, the use of celery leaf decoction should be focused on as a complementary therapy, not a substitute for the main medical treatment, in order to

obtain optimal results and avoid the risk of complications.However, the researchers are also aware of the limitations in this study design, such as the absence of a control group, and the lack of standardization of dosage and brewing method. Therefore, the researchers recommend that further research be conducted using a randomized controlled clinical trial (RCT) design with a larger sample size, as well as long-term monitoring to evaluate its ongoing effects and safety on organ function, such as kidney and liver.

Overall, the results of this study reinforce the scientific evidence that celery leaf steeping has the potential as a nonpharmacological intervention in lowering blood pressure in hypertensive elderly. These findings are in line with a study by Zhang et al. (2023) which demonstrated the effectiveness of herbal extracts as complementary therapies in the management of hypertension without causing serious side effects. In addition, research by Kumar and Singh (2022) confirms that the use of local herbs, including celery leaves, is increasingly widely accepted due to their safety and ease of access, thus opening up opportunities for the use of herbs as part of an effective, safe, and acceptable complementary medicine approach to the wider community.

The results of this study provide important implications, both clinically and in the community. Clinically, celery leaf decoction can be used as an additional (complementary) therapy to reduce blood pressure, especially in elderly patients who have limited access to conventional treatment or who experience side effects from antihypertensive drugs. From the community side, these results can be the basis for health education based on the utilization of family medicinal plants (TOGA).

CONCLUSIONS

Based on the research conducted, it can be concluded that the average systolic blood pressure of respondents before the intervention was 147.6 mmHg, which then decreased to 133.4 mmHg after 14 days of celery leaf decoction consumption, with a statistical p-value of 0.000 ($p < 0.05$). Meanwhile, diastolic blood pressure also decreased from an average of 92.3 mmHg to 85.1 mmHg, with a statistical p-value of 0.001 ($p < 0.05$). These findings indicate that celery leaf decoction can be used as an alternative complementary therapy in the management of hypertension, particularly among the elderly, thereby reducing dependence on antihypertensive drugs. It is recommended that Puskesmas (community health center) officers educate the public about the benefits of traditional medicine, especially Family Medicinal Gardens (TOGA), or Family Medicinal Gardens, where medicinal plants are cultivated for household use.

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