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**RESEARCH ARTICLE**

# Clinical Observation of the Effectiveness of Fragrant Pandan Leaves *(Pandanus Amaryllifolius Roxb.)* To Lower Blood Pressure in Hypertensive Patients at Pratama Clinic Medan Tenggara

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**ABSTRACT**

**Introduction:** Nowadays, hypertension is a big problem. The disease is becoming more common. Alternative hypertension treatment includes many plant species. Fragrant pandan leaves are one example. Not many people know the antihypertensive properties of this herb. This study tested the effect of fragrant pandan leaf simplicia in lowering blood pressure in hypertensive patients. **Methods:** This study is an experimental study with pre-test and post-test without control group design. Twenty men and women were given 14 bags of pandan leaf simplicia in this study after which the study subjects drank 1 tea bag with 150-200ml of warm water twice a day for 7 days. Because systolic blood pressure data is normally distributed, a paired t-test is used, while diastolic blood pressure data is used a Wilcoxon test because the data is not normal. **Results:** Fragrant pandan leaves lowered blood pressure by 20/10 mmHg ($p<0.05$). **Discussion:** Fragrant pandan leaves are effective in lowering blood pressure.

**Keywords:** Blood pressure, Fragrant pandan leaves (Pandanus amaryllifolius Roxb.), Hypertension.

## INTRODUCTION

High blood pressure or hypertension is a disease that is a serious problem today. Hypertension will increase the number of illnesses and deaths. Systolic blood pressure of 140 mmHg indicates a phase of cardiac contraction when pumping blood, while a diastolic blood pressure of 90 mmHg indicates cardiac relaxation. [1] Hypertension is a non-communicable disease condition, which is a major contributor to premature death worldwide.[2]

The World Health Organization (WHO) now estimates that hypertension affects about 22% of the global population. Hypertension affects 1.39 billion people worldwide, according to this epidemiology it is expected to increase by 15% to 20% to 1.5 billion people with hypertension by 2025.[3] In 2019, 32.28% of men in North Sumatra Province suffered from high blood pressure, and 31.68% of women suffered. However, this incidence increases with age. [4]

Fragrant pandan leaves are tropical plants that are used as flavorings for food and drinks. The scent of pandanus, with delicate leaves, is very popular in the yards of people's houses in Southeast Asia. Its distinctive aroma earned it the nickname "pandan wangi". Thus, the term "pandan" can be understood to refer to a specific species of the genus Pandanus, as

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well as being a name associated with the chemical 2-acetyl-1-pyrolin (ACPY). [5]

Focusing on the herbal plant, Pandanus amaryllifolius or fragrant pandanus, is a tropical plant that is widely used in food and beverage processing in Southeast Asia.[6,7] Although previously known only as an aroma giver, recent phytochemical research has revealed that fragrant pandan leaves contain flavonoids, specifically quercetin types, which have antihypertensive effects. This flavonoid works by inhibiting the Angiotensin Converting Enzyme (ACE) so that angiotensin II does not form in blood vessels, resulting in a decrease in blood pressure, and causing vasodilation in the smooth muscles of the arteries. Thus, fragrant pandan can be considered a potential source for a nonpharmacological approach in the management of hypertension. [8]

The administration of fragrant pandan leaves has been shown to be effective in lowering blood pressure, reducing the average systolic blood pressure from 161.1 mmHg to 146.1 mmHg and diastolic blood pressure from 91.8 mmHg to 89.7 mmHg in studies involving rats. Although this study was conducted on rodents, fragrant pandan leaves do not have harmful effects on humans. Flavonoids in pandan leaves can reduce the activity of Angiotensin Converting Enzyme (ACE). [9] Free radicals can interfere with the vasodilation work of blood vessels thereby increasing blood pressure in the elderly. Due to its antioxidant concentration, pandan fragrant can inhibit chemicals that increase vasoconstriction of blood vessels, so it can keep blood pressure from increasing. [10]

People with hypertension are often required to take medication throughout their lives to maintain blood pressure stability and prevent further complications. However, concerns about the potential side effects of the drugs prompted people to look for alternative treatments, such as using herbal plants, to control blood pressure. Based on this problem, researcher is interested in researching the efficacy of infusion of fragrant pandan leaves (Pandanus amaryllifolius Roxb.) in lowering blood pressure in hypertensive patients. [11]

## RESEARCH METHODS

The quantitative research used a quasi-experimental design *of "pre and post test without control group design"*. Research at the Tasbi 2 Block VI No. 57 Medicinal Plant Development Research Laboratory produced pandan leaf simplicia. Each research sample was measured for blood pressure at the Southeast Medan Primary Clinic and at the home of each research sample.

Patients at the Medan Tenggara Primary Clinic with hypertension became the research population. Medical records show 25 hypertensive patients at the clinic. *Purposive sampling* was used in this study. Inclusion and exclusion criteria determine the selection of samples, with inclusion criteria involving blood pressure must be ≥140/90 mmHg or more, hypertensive patients aged 30-80 years, and participants willing to participate in the study. Meanwhile, exclusion criteria include individuals with hypertension who are taking ACE/ARB, as well as individuals who are taking TCA, corticosteroids, or monoamine oxidase inhibitor drugs. The calculation of the number of samples using the Slovin formula yields the number 20 as the minimum number of samples needed.

Pre-test *and* post-test *data* were collected for this study. The pretest measures the blood pressure of the study subjects before being given treatment, and the posttest is carried out 7 days later after being given

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treatment. The tools and materials used include a sphygmomanometer, littmann stethoscope, scales, drying cabinet, pandan leaves, tea bags, mesh/sieve, buckets, and knives/scissors.

The research procedure includes how to make simplicia fragrant pandan leaves, starting with washing fragrant pandan leaves, drying them, and grinding them into simplicia which is then put into bags. Next, the procedure for making fragrant pandan leaf drink involves opening the pandan leaf bag, placing it in a glass, and adding warm water.

Blood pressure measurements were carried out using a sphygmomanometer and stethoscope, with examination preparations such as ensuring that the sample was calm, did not smoke or drink caffeine for at least 30 minutes before the examination, and took a break after light physical activity. The measurement process involves determining the systolic pressure of the palpatoir, the use of a stethoscope to listen for Korotkoff sounds, and the measurement of diastolic pressure. The validity of the blood pressure test is guaranteed by taking a minimum of 3 measurements, and the results are taken as an average of the measurements.

The research sample underwent a treatment regimen in the form of giving infusion of fragrant pandan leaves twice a day for 7 days, with consumption in the morning and evening. Before administering medication, blood pressure is first assessed. Furthermore, on days 3, 6, and 8, careful examination and supervision were carried out to monitor the potential side effects that may arise after treatment.

The data in this study was analyzed through SPSS software and then displayed in table format. Data is displayed using frequency and percentage. Numerical data is displayed using mean, median, and SD. If the data are normally distributed, a paired T test compares blood pressure before and after therapy. If the data is not normally distributed, the Wilcoxon test is used.

## RESULTS

The research was conducted at the Southeast Medan Primary Clinic in Medan Denai District, Medan City Regency, North Sumatra. The Ethics Commission approved this study with reference 1095/KEPK/FKUMSU/2023. The goal is to find out the effect of fragrant pandan leaves on the blood pressure of hypertensive patients. The research took place in November and December 2023.

This study involved 20 hypertension patients who were treated at the Medan Tenggara Primary Clinic in Medan Denai District, Medan City Regency, North Sumatra. Twenty research patients received treatment in the form of fragrant pandan leaf simplicia.

Before providing therapy, hypertensive patients undergo an initial blood pressure assessment to obtain an average blood pressure *(pre-test)*. The sample received 14 bags of fragrant pandan leaf simplicia to be consumed twice a day for 7 days. The results of this study are expected to provide an understanding of the potential effects of fragrant pandan leaves on blood pressure in hypertensive patients.

**Table 1. Identification Results of Fragrant Pandan Leaf Extract**

| Component | Result | Color/Precipitation |
|---|---|---|
| Flavonoid | + | The formation of yellow-orange color |

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| Component | Result | Color/Precipitation |
|---|---|---|
| Saponin | + | Stable foam formation for 10 minutes (foam does not disappear) |
| Tanin | + | The occurrence of a greenish-black discoloration |
| Alkaloid | + | Yellow deposits (Mayer), Brick-red deposits (Dragendorff) |

Phytochemical examination is carried out to identify the components contained in fragrant pandan leaves. Based on the results of phytochemical analysis, it was revealed that ethanol extract from fragrant pandan leaves contains flavonoids, saponins, tannins, and alkaloids. Detailed information about phytochemical screening of fragrant pandan leaf extract can be seen in table 1.

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**Table 2. Blood pressure before treatment for the study subjects at the Southeast Medan Primary Clinic**

| Blood pressure | Mean | Median | SD |
|---|---|---|---|
| Sistolic Pre-test | 155,50 | 155,50 | 10, 54 |
| DiastolicPre-test | 95,35 | 94.50 | 4,9 3 |
| Total | 20 | | |

From table 2, it can be seen that the results of the analysis obtained on average and the standard deviation of *pre-systolic* blood pressure were 155.50±10.54$ mmHg with a median value of 155.50 mmHg. The results of the analysis for diastolic pressure were obtained by *the diastolic pre-test* of 95.35±4.93 mmHg with a median value of 94.50 mmHg.

**Table 3. Blood pressure after treatment to the research subjects at the Southeast Medan Primary Clinic**

| Blood pressure | Mean | Median | SD |
|---|---|---|---|
| Sistolik Post-test | 135,30 | 135,00 | 8,96 |
| Diastolik Post-test | 85.10 | 84,00 | 5.15 |
| Total | 20 | | |

From the results of the analysis, the average and standard deviation of blood pressure *after* the systolic test was 135.30±8.96 mmHg with a median value of 135.00 mmHg. The results of the analysis for diastolic pressure

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were obtained *post-test* diastolic of 85.10±5.52 mmHg with a median value of 84.00 mmHg.

**Table 4. Paired T Test**

| Paired Differences 95% CI of the Difference Upper | t | df | Sig. (2-tailed) |
|---|---|---|---|
| Pair 1 Pretest - Posttest 22.560 | 17.913 | 19 | .000 |
| 17.839 | | | |

On the systolic blood pressure value, a dependent t test was carried out because the data was distributed normally, the results of the dependent t test were obtained p=0.000 (p<0.05) which means that there is a significant difference in the mean blood pressure before and after with a mean difference of 20.20 mmHg.

**Table 5. Wilcoxon Test**

| Posttest day 8 diastolic - Pretest diastolic | |
|---|---|
| Z | -3.931 |
| Asymp. Sig. (2-tailed) | .000 |

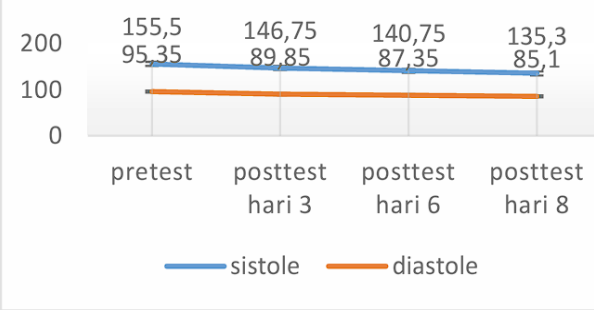
At the value of diastolic blood pressure, the Wilcoxon test was carried out because the data was not distributed normally, the results of the Wilcoxon test were obtained p=0.000 (p<0.05) which means that there was a significant difference in the mean blood pressure before and after with a mean difference of 10.25 mmHg.

**Table 6. Clinical Observation of the Effectiveness of Fragrant Pandan Leaves to Lower Blood Pressure in Hypertensive Patients**

| Research Subject | Blood pressure | Measurement Values | Difference | Value p |
|---|---|---|---|---|
| Treatment | Pretest | 155/95 | 20/10 | <0.05 |
| | Post test | 135/85 | | |

Based on table 6 above the p value of <0.05, this shows that there is a significant difference in blood pressure before and after treatment.

**Figure 1. Blood Pressure Graph Before Treatment (Pretest) and After Treatment (*Post-test*)**




From figure 1 above, it can be seen that there was a significant decrease in blood pressure after the respondent was given treatment where the p<0.05 value.

## DISCUSSION

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The results of a study on the effectiveness of infusion of fragrant pandan leaves in lowering blood pressure in hypertensive patients showed a significant difference between blood pressure before and after treatment. The mean difference in blood pressure before and after treatment reached 20/10 mmHg ($p<0.05$). This finding is in line with a study conducted by Restichia Sasabone According to the research conducted, the consumption of fragrant pandan leaves has an impact on the blood pressure of elderly women with hypertension in Nusalaut, Central Maluku. In this study, the average initial blood pressure of elderly hypertensive women was 170.59/95.88 mmHg. After treatment with pandan leaves and antihypertensive drugs, blood pressure decreased to 152.35/84.12 mmHg in the group taking only antihypertensive drugs. After 14 days of treatment with pandan leaf decoction and antihypertensive drugs, there was a higher average difference in systolic and diastolic blood pressure compared to the group taking antihypertensive drugs alone. Although there was a significant difference in the decrease in systolic blood pressure between the experimental group and the control group, there was no significant difference in the decrease in diastolic blood pressure [7].

It was also found in a study conducted by Safitri W, et al. regarding the impact of consumption of fragrant pandan leaf boiled water (Pandanus amaryllifolius Roxb.) on blood pressure variations in individuals with hypertension in the working area of the Jaten II Health Center. The study involved a total of 20 participants, with 10 people being put in the control group and 10 people being put in the treatment group. Each participant of the experimental group received 400 ml of fragrant pandan leaf water containing 6 grams of pandan leaves, then reduced to 200 ml after boiling.[12]

Based on these findings, it is evident that the treatment can effectively lower systolic and diastolic blood pressure, with the average blood pressure before treatment being 159/91 mmHg. The average systolic and diastolic blood pressure after treatment was recorded at 132/81 mmHg. The findings of this study show an important impact of giving boiled water mixed with pandan leaves on blood pressure. The presence of flavonoids in pandan leaves contributes to its ability to lower blood pressure. [13]

In a study conducted by Misbahul Jannah regarding the efficacy of pandan leaf extract (Pandanus amaryllifolius Roxb) as an anti-hypertensive drug. Oral administration of pandan leaf extract in male white rats provoked by NaCl 3% was effective in lowering blood pressure.[14] Intravenous (IV) doses of 1000mg/200gBW were most efficient in lowering blood pressure in rats. It can reduce blood pressure from 144.3/130 mmHg to 128.6 mmHg/90.6 mmHg. Statistical tests conducted on the treatment group had an impact on lowering blood pressure. In addition, the duration of dosing affects the decrease in systolic and diastolic blood pressure. [15]

In the study of IW Mustika, et al. regarding the use of fragrant pandan leaves (Pandanus amaryllifolius Roxb) in reducing hypertension in the elderly, the results showed that the average systolic blood pressure of the elderly before the administration of fragrant pandan leaf decoction was 161.1 mmHg, while the average diastolic blood pressure was 91.8 mmHg. After 1 month of giving fragrant pandan leaf decoction, there was a significant decrease in blood pressure, with a decrease in the average systolic blood pressure of 146.1 mmHg and diastolic blood pressure of 89.7 mmHg. [9]

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The flavonoids involved are quercetin class flavonoids. Quercetin, a member of the flavonoid, exhibits powerful antioxidant properties and effectively inhibits the oxidation process by warding off free radicals. [16]Flavonoids have the ability to lower blood pressure by suppressing the activity of the Angiotensin Converting Enzyme (ACE) mechanism, thereby preventing the formation of angiotensin II in the blood arteries. Quercetin-type flavonoids have the ability to directly affect arterial smooth muscles by stimulating or activating Endothelium Derived Relaxing Factor (EDRF), resulting in vasodilation. [13]

Quercetin plays an important role in treating endothelial dysfunction and has antihypertensive effects. Its mechanism of action involves an increase in the concentration of intracellular calcium [Ca2+] in endothelial cells, which induces endothelial hyperpolarization through activation of Ca2+ that activates the K+ channel.[17] In addition, quercetin also mediates vasodilation by increasing the production of nitric oxide (NO) in the endothelium, demonstrating its role in improving endothelial function.[18,19] Interestingly, quercetin produces vasodilation through different mechanisms in different layers of blood vessels. In the mesenteric arteries of mice, the endothelium contribution was noticeably significant, while in the rat aorta, quercetin acted through the inhibition of the Ca2+ channel. The study highlights quercetin's potential as a vasodilator agent with varying mechanisms across different layers of blood vessels.[20,21]

## CONCLUSION

Research findings show that fragrant pandan leaves are effective in lowering blood pressure in individuals with hypertension.

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