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EFFECT OF BAY LEAF DECOCTION ON THE REDUCTION OF BLOOD PRESSURE AND MALONDIALDEHYDE (MDA) LEVELS IN ELDERLY WOMEN WITH HYPERTENSION

Pengaruh Rebusan Daun Salam terhadap Penurunan Tekanan Darah dan Kadar MDA (Malondialdehyde) Wanita Lansia Hipertensi

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ABSTRAK

Tekanan darah tinggi dapat terjadi disetiap usia, terutama pada lansia. Tujuan dari penelitian ini untuk mengetahui mengetahui pengaruh rebusan daun salam (Syzygium Polyanthum) terhadap penurunan tekanan darah dan kadar Malondialdehyde (MDA) pada wanita lansia hipertensi. Jenis penelitian yaitu Quasi Experimental pre-test and post-test with control group design. Sampel dipilih dengan kriteria inklusi yaitu wanita lansia berusia ≥ 60 tahun dengan diagnosis hipertensi, sedangkan kriteria eksklusi meliputi wanita lansia yang memiliki riwayat penyakit ginjal dan jantung. Sampe l penelitian seluruh wanita lansia penderita hipertensi sebanyak 34 orang terdiri atas kelompok kontrol 17 orang dan intervensi 17 orang. Rata-rata usia wanita lansia hipertensi 63,91 tahun dan kadar IMT normal (91,2%). Intervensi pemberian rebusan daun salam dosis 5 gr dan Amlodipine 5mg/hari. Tekanan darah sistolik sebelum dan setelah diberi rebusan daun salam rata-rata 166.06 mmhg dan 149.29 mmHg, sedangkan diastolik sebelum dan setelah diberi rebusan daun salam rata-rata 104.29 mmHg dan 86 mmHg. Kadar MDA sebelum diberi rebusan daun salam mendapatkan rata-rata 3,5941 nmol/mL, sedangkan kadar MDA setelah diberi rebusan daun salam mendapatkan rata-rata 2,2035 nmol/mL. Berdasarkan hasil pengamatan terdapat pengaruh rebusan daun salam (Syzygium Polyanthum) terhadap kadar MDA pada wanita lansia hipertensi yang diberi rebusan daun salam secara signifikan mengalami penurunan tekanan darah (p-value =0,009).

***Kata kunci**: daun salam, lansia, MDA, tekanan darah*

ABSTRACT

High blood pressure can occur at any age, especially in the elderly. The purpose of this study was to determine the effect of bay leaf decoction (Syzygium Polyanthum) on reducing blood pressure and MDA levels in Elderly Hypertensive Women. The type of research was quasi-experimental, pre-test and post-test with a control group design. The sample was selected with inclusion criteria, namely elderly women aged ≥ 60 years with a diagnosis of hypertension, while the exclusion criteria included elderly women who had a history of kidney and heart disease. The study sample was all elderly women with hypertension, as many as 34 people, consisting of a control group of 17 people and an intervention group of 17 people. The average age of elderly women with hypertension was 63.91 years, and BMI was normal (91.2%). Intervention of giving bay leaf decoction at a dose of 5 g and Amlodipine 5mg/day. Systolic blood pressure before and after being given decoction bay leaves averaged 166.06 mmHg and 149.29 mmHg, while diastolic blood pressure before and after being given decoction bay leaves averaged 104.29 mmHg and 86 mmHg. MDA levels before being given decoction bay leaves averaged 3.5941 nmol/mL, while MDA levels after being given decoction bay leaves averaged 2.2035 nmol/mL. Based on the results of observations, there was an effect of decoction

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bay leaves *(Syzygium polyanthum)* on MDA levels in Elderly Hypertensive Women. Hypertensive women who were given decoction bay leaves significantly experienced a decrease in blood pressure (*p-value* = 0.009).

Keywords: bay leaves, blood pressure, elderly, MDA

PENDAHULUAN

According to the WHO *(World Health Organization),* about 1.28 billion adults aged 30–79 years in the world suffer from hypertension, and two-thirds of them live in low- and middle-income countries. As many as 46% were unaware of the disease, and only 42% were diagnosed and received treatment. Only 21% of sufferers managed to control their blood pressure. Hypertension is one of the leading causes of premature death in the world. WHO targets a 33% decrease in the prevalence of hypertension from 2010 to 2030. If hypertension treatment is improved as in countries with good health systems, it can prevent millions of deaths, strokes, heart attacks, and heart failures by 2050.[1]

Based on the 2023 Indonesian Health Survey, the prevalence of hypertension in Indonesia is higher in women (34.7%) than in men (26.9%). The prevalence also increased with age, namely 11.8% at the age of 45–54 years, 18.7% at the age of 55–64 years, 23.8% at the age of 65–74 years, and reached 26.1% at the age of 75 years and above.[2]

Hypertension is divided by severity, ranging from mild (diastolic 90–104 mmHg), severe (105–120 mmHg), to malignant (more than 120 mmHg). Although often asymptomatic, many sufferers are unaware of the risks. If left untreated, hypertension can lead to serious complications such as heart disease, kidney failure, or stroke. That's why hypertension is called a *silent killer*.[3]

Some of the risks of hypertension consist of two types: those that cannot be changed, such as age, gender, and genetics, as well as those that can be changed, such as obesity, stress, smoking, lack of physical activity, excessive alcohol and salt consumption, and hyperlipidemia.[4]

Malondialdehyde (MDA) is the end product of lipid peroxidation and is used as a marker of oxidative stress. High levels of MDA are often associated with hypertension and other chronic diseases. MDA levels are greatly influenced by many factors such as age, diseases suffered, stress, various pollutants, food consumption, antioxidant supplements, excessive physical activity, and exercise, and others. The study by Nova et al obtained results of more than 30% of subjects having high *MDA* levels. Then, smoking habits are also related to *MDA* levels. Recent studies show that there is no significant difference in plasma *MDA* levels in the 60-year-old and 70-year-old populations, but there is an increase in the specific activity of the catalase enzyme increasing with age. Another study showed that there was a significant difference in plasma *MDA* levels in the non-metabolic syndrome obesity group compared to the obese group with metabolic syndrome.[5]

Bay leaf *(Eugenia polyantha)* contains flavonoid compounds, tannins, and vitamin B3, which are antioxidants and are thought to reduce hypertension. This study aims to determine the effectiveness of bay leaf extract in reducing MDA levels compared to amlodipine as a control.[6]

One form of nonpharmacological therapy in managing hypertension, especially with high blood pressure and increased MDA levels, is to eat vegetables and fruits that have high fiber and antioxidant content. Some of the plants that have these ingredients include tomatoes, papayas, soursop, carrots, oranges, mangoes, and bay leaves. From these various options, the researcher chose bay leaf *(Syzygium polyanthum)* as the object of the study because it contains beta-carotene, vitamins, and high fiber that act as

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antioxidants. Bay leaf decoction is known to have the potential as an herbal therapy to lower blood pressure and MDA levels.[7]

Based on the research of Bahriul (2014), the results of the antioxidant activity test in young bay leaves were 37,441 ppm, half-old bay leaves were 14,889 ppm, and old bay leaves were 11,001 ppm.[8] Antioxidant activity affects reducing blood pressure and MDA levels.[9]

In line with the research of Setiowati *et al* (2018), it is explained that the compounds in soursop leaves, namely flavonoids, alkaloids, coumarins, steroids, and tannins have a significant influence on the profile of MDA levels ($p<0.05$). The results of the study obtained were IC50 of 66.08 ppm (strong), MDA levels in the soursop leaf infusion group on days 0, 7 and 14 had a value of 0.470 nmol/mL; 0.652 nmol/mL and 0.470 nmol/mL.[10]

Bay leaves are widely used as a traditional medicine for hypertension. Bay leaf plants grow in tropical areas, one of which is in Indonesia, and are known to have benefits in lowering cholesterol, gout, stress, and maintaining heart and immune health. [11]Although it is often used, research on the effectiveness of bay leaves in lowering blood pressure in the elderly is still limited. Based on data from the North Bengkulu Regency Health Office, hypertension cases increased from 3,625 in 2021 to 5,106 in 2023. Therefore, this study aims to determine the effect of bay leaf decoction *(Syzygium polyanthum)* on reducing blood pressure and MDA levels in elderly women with hypertension.

METHODS

This research was conducted in November 2024 with a pre-test and post-test quasi-experimental design with a control group. The study subjects consisted of 34 elderly women with hypertension, who were divided into 17 people in the intervention group and 17 people in the control group. This research took place in November 2024 and was carried out after the Ethical Clearance submitted by the researcher was approved by the Health Research Ethics Committee of the Ministry of Health of the Ministry of Health of Semarang with number 1146/EA/F.XXIII.38/2024, which is valid from September 18, 2024, to September 18, 2025.

Samples were selected using *the purposive sampling* method with inclusion criteria, namely elderly women aged ≥ 60 years with a diagnosis of hypertension. Elderly women with systolic blood pressure ≥ 160-179 mmHg or diastolic≥ 100-109 mmHg, and elderly women who are taking a single hypertension medication and not consuming herbs or other supplements. Elderly women in full consciousness (compos mentis). Respondents who signed informed consent were included in the inclusion criteria, while the exclusion criteria included elderly women who had a history of kidney and heart disease.

All respondents were included in the inclusion criteria as elderly women who had been diagnosed with hypertension and were undergoing pharmacological therapy using the antihypertensive calcium channel blocker group, namely Amlodipine 5 mg per day. During the intervention period, the control group continued to take Amlodipine as prescribed by the doctor without additional treatment. Meanwhile, the intervention group was given additional treatment in the form of bay leaf decoction (Syzygium polyanthum). Both groups continued to take antihypertensive medications as part of standard therapy, and the administration of bay leaf decoction was carried out as an additional intervention that was observed to affect blood pressure and MDA levels. This approach was chosen to maintain the ethical principles and safety of the study subjects, as well as to evaluate the effectiveness of bay leaf

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decoction as a complementary therapy in elderly hypertensive patients.

For five consecutive days, the intervention group was given a decoction of bay leaves (Syzygium polyanthum) as much as 350 milliliters per day. The decoction begins by boiling five grams of bay leaves at a medium temperature for fifteen minutes. The control group received a common antihypertensive drug, amlodipine, prescribed by their doctor. The intervention group received a decoction of bay leaves (5 grams per day) and still received amlodipine 5 mg per day, while the control group received only 5 mg per day according to health care standards. In this study, both groups still received Amlodipine. Ethical considerations for this study include keeping the identity of participants confidential, providing explanations and seeking consent before participating, and ensuring that the data collected is used only for research purposes.

The specimen used to measure Malondialdehyde (MDA) levels is serum blood obtained from elderly women with hypertension. MDA levels were checked by *the Thiobarbituric Acid Reactive Substances* (TBARS) method using a UV-Vis spectrophotometer. Normal levels of MDA in serum are generally in the range of 1–2 nmol/mL.[12] The high sensitivity of TBARS can detect free MDA with a minimum detection limit of 18.75 ng/mL and a detection range between 31.25 to 2000 ng/mL. The TBARS method utilizes a simple spectrophotometric reaction, in which one molecule of MDA will react with two molecules of thiobarbiturate acid (TBA), forming a pink-colored complex. The compound was then analyzed by measuring its absorbance at a wavelength of 532 nm.[13]

The testing was carried out at the Laboratory of the Faculty of Medicine, Universitas Bengkulu. The average MDA level before the intervention was 3.5941 nmol/mL, while the control group (Amlodipine) was 4.5953 nmol/mL.

The data were statistically analyzed using SPSS software. Univariate analysis to describe the characteristics of respondents. Bivariate analysis to test differences in outcomes between control groups and interventions using paired t-test, independent t-test, Wilcoxon, and Mann-Whitney tests.

RESULT

The results showed a decrease in systolic and diastolic blood pressure in the elderly with hypertension after being given a bay leaf decoction. In addition, MDA levels also decreased, and the results were analyzed to see the significant effect of bay leaf decoction on MDA levels in the hypertensive elderly.

Table 1. Distribution of Respondents Based on Systolic Blood Pressure Among Elderly Women with Hypertension

Group	Mean (mmHg)	Median (mmHg)	SD	Min–Max (mmHg)
Intervention				
Pretest (Bay Leaf Decoction)	166.06	165	1.083	161–175
Posttest (Bay Leaf Decoction)	149.29	147	1.124	142–159
Control				
Pretest (Amlodipine)	164.12	164	0.813	160–172
Posttest (Amlodipine)	153.59	154	1.163	147–166

In Table 1, the average systolic blood pressure before the administration of bay leaf decoction was 166.06 mmHg and decreased to 149.29 mmHg after the intervention. Meanwhile, the Amlodipine group showed a decrease from 164.12 mmHg to 153.59 mmHg. Both interventions showed a decrease in blood pressure, but a greater decrease occurred in the bay leaf group.

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Table 2. Distribution of Respondents Based on Diastolic Blood Pressure in Hypertensive Elderly Women

Group	Mean	Median	SD	Min-Max
Intervention				
Bay Leaf Decoction Pretest	104.29	104	0.848	100-114
Bay Leaf Decoction Posttest	86	86	0.507	82-89
Control				
Pretest Amlodipine	103.71	103	0.623	100-109
Posttest Amlodipine	92.06	92	0.644	86-96

Based on Table 2, the diastolic blood pressure in the bay leaf decoction group decreased from an average of 104.29 mmHg to 86 mmHg. Meanwhile, in the Amlodipine group, there was a decrease from 103.71 mmHg to 92.06 mmHg. A greater decline occurred in the bay leaf cluster.

Table 3. Distribution of Respondents Based on *MDA* Levels in Elderly Women with Hypertension Hypertensive Elderly Women

Group	Mean	Median	SD	Min-Max
Intervention				
Bay Leaf Decoction Pretest	3.5941	3.2500	1.29148	2.05-6.91
Bay Leaf Decoction Posttest	2.2035	2.1100	0.52501	1.47-3.58
Control				
Pretest Amlodipine	4.5953	4.3400	2.05853	2.01-8.06
Posttest Amlodipine	2.7529	2.4300	0.98248	1.69-6.00

Based on Table 3, it is known that MDA cadres before being given bay leaf decoction got an average of 3.5941 nmol/mL with an SD value of 1.29148 nmol/mL. Meanwhile, the MDA level after being given a bay leaf decoction obtained an average of 2.2035 nmol/mL with an SD value of 0.52501 nmol/mL. Meanwhile, MDA levels before being given Amlodipine obtained an average of 4.5953 nmol/mL with an SD value of 2.05853 nmol/mL. Meanwhile, MDA levels after being given amlodipine obtained an average of 2.7529 nmol/mL with an SD value of 0.98248 nmol/mL.

Table 4. The Difference Between Bay Leaf Stew *(Syzygium Polyanthum)* Against Reducing Systolic and Diastolic Pressure in Hypertensive Elderly Women

Variabel	Group	Mean Rank	*p-value*
Systolic Blood Pressure	Pretest Posttest	16.765	0.000
Diastolic Blood Pressure	Pretest Posttest	9.00	0.000

Based on Table 4, bay leaf decoction has been proven to be effective in lowering blood pressure in the hypertensive elderly. Then the results of the t-test showed a significant decrease in systolic blood pressure (p = 0.001), and the Wilcoxon test showed a significant decrease in diastolic blood pressure (p = 0.000).

Table 5. Differences in Amlodipine Administration for Reducing Systolic and Diastolic Pressure in Hypertensive Elderly Women

Variabel	Group	Mean Rank	*p-value*
Systolic Blood Pressure	Pretest Posttest	10.529	0.000
Diatolic Blood Pressure	Pretest Posttest	11.647	0.000

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Based on Table 5, the results of the Paired Samples t-test showed a value of ρ = 0.000 (< 0.05), which means that there was a significant difference in systolic and diastolic blood pressure before and after administration of amlodipin in elderly hypertensive women.

Table 6. Effect of Bay Leaf Decoction *(Syzygium Polyanthum)* on Blood Pressure Reduction in Hypertensive Elderly Women

Variabel	Group	*p-value*
Systolic Blood Pressure	Control Intervention	0.012
Diastolic Blood Pressure	Control Intervention	0.000

The results in Table 6 in the form of the Independent Samples t-test show that bay leaf decoction has a significant effect on reducing blood pressure in the hypertensive elderly. The *p-value* for systolic blood pressure was 0.012 and for diastolic 0.000 (p < 0.05), which means there was a significant difference between the intervention and control groups.

Table 7. The Difference Between Bay Leaf *Stew (Syzygium Polyanthum)* Against Reducing *MDA* Levels in Hypertensive Elderly Women

Variabel	Group	n	Mean Rank	*p-value*
MDA Levels	Pretest Posttest	17 17	9.00	0.000

It is known that the results of the analysis of the Wilcoxon Signed Ranks Test in table 7 obtained a ρ value of 0.000 < 0.05, this means that the hypothesis is accepted, which means that there is a significant difference in the decoction of bay leaves *(Syzygium Polyanthum)* to *MDA levels* in elderly hypertensive women because the value of ρ (0.000) < 0.05 at a significance level of 5%

Table 8. Differences in Amlodipine Administration and Reduction in *MDA* Levels in Hypertensive Elderly Women

Variabel	Group	Mean Rank	*p-value*
MDA Levels	Pretest Posttest	9.00	0.000

Based on Table 8, the results of the Wilcoxon test showed a value of p = 0.000 (p < 0.05), which means that the administration of amlodipine had a significant effect on reducing MDA levels in hypertensive elderly women.

Table 9. Effect of Bay Leaf Decoction *(Syzygium Polyanthum)* on Reducing *MDA* Levels in Hypertensive Elderly Women

Variabel	Group	Mean Rank	*p-value*
MDA Levels	Posttest Control Posttest Intervensi	21.85 13.15	0.009

Based on table 9, the ρ-value is 0.009 < 0.05, this shows that the hypothesis is accepted so that there is a significant difference between bay leaf decoction *(Syzygium Polyanthum)* and a decrease in *MDA levels* in elderly hypertensive women because the ρ-value (0.005) < 0.05 at a significance level of 5%.

DISCUSSION

The results showed that the average age of elderly respondents was 63.91 years, with the majority aged 60–70 years. According to WHO, the age of 60 years and older is categorized as elderly, which is the natural phase of life after the productive period,

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characterized by a gradual decline in bodily function in responding to internal and external stimuli. According to WHO, the elderly are divided into: 60–74 years old (elderly), 75–90 years old (elderly), and >90 years old (very old age). Other classifications are pre-elderly (45–59 years), elderly (60–69 years), and high-risk elderly (≥70 years old or ≥60 years old with health problems).[14,15]

The results showed that the majority of the elderly had a normal body mass index (BMI) (91.2%) and a small percentage were classified as obese (8.8%). The normal BMI of the elderly is recommended to range from 25 to 27.3. BMI is calculated from body weight divided by height squared and is used to assess nutritional status. Low BMI increases the risk of infection, fatigue, and pregnancy complications, while high BMI increases the risk of degenerative diseases such as diabetes and cardiovascular disease.[16]

The results showed that bay leaf decoction and Amlodipine were equally effective in lowering blood pressure in elderly women with hypertension. Bay leaf decoction lowered systolic blood pressure from an average of 166.06 mmHg to 149.29 mmHg (a decrease of 16.77 mmHg), and diastolic pressure from 104.29 mmHg to 86 mmHg (a decrease of 18.29 mmHg). Meanwhile, Amlodipine lowered systolic blood pressure from 164.12 mmHg to 153.59 mmHg (a decrease of 10.53 mmHg) and diastolic pressure from 103.71 mmHg to 92.06 mmHg (a decrease of 11.65 mmHg). These findings suggest that bay leaf decoction has a greater blood pressure-lowering effect than Amlodipine. According to InaSH (Indonesian Hypertension Association), hypertension is a condition when systolic blood pressure exceeds 140 mmHg or diastolic pressure exceeds 90 mmHg. If the blood pressure is below 160/100 mmHg, then the diagnosis of hypertension needs to be confirmed through two measurements in a span of one week.[17]

The dose of bay leaf decoction given in this study was 5 grams/day, taken twice a day (morning and evening) before meals. The majority of the Body Mass Index (BMI) in this study was in the normal category (25-27.3), which follows the National Institutes of Health standards. [18]

After the intervention for 5 days, the blood pressure of respondents who consumed bay leaf decoction decreased from 166.06 to 149.29 mmHg (systolic) and from 104.29 to 86 mmHg (diastolic). Respondents were also advised to continue consuming this decoction regularly after the study.

MDA levels also decreased significantly: in the bay leaf group, from 3.5941 to 2.2035 nmol/mL (a decrease of 1.3906 nmol/mL); while in the Amlodipine group, from 4.5953 to 2.7529 nmol/mL (a decrease of 1.8424 nmol/mL). These findings suggest that both interventions lower levels of oxidative stress, with Amlodipine showing a greater reduction in MDA, while bay leaf decoction more effectively lowers blood pressure.MDA is a result of lipid peroxidation in the body. MDA concentration indicates an oxidation process that occurs in the cell membrane of the body due to metabolic processes. One of the factors that causes aging is the production of excess reactive oxygen species (ROS). ROS is produced through the process of cellular respiration in mitochondria and the phagocytosis process of foreign body elimination. To maintain a stable ROS amount, the body can use both endogenous and exogenous antioxidants. Disruption of the balance between ROS and antioxidants can cause irreversible damage to cell organelle components down to the DNA level.[19]

MDA levels are greatly influenced by many factors such as age, diseases suffered, stress, food consumption, antioxidant supplements, physical activity and excessive exercise, and others. The study by Nova et al.

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obtained results of more than 30% of subjects having high *MDA* levels, and concluded that there was a meaningful relationship between body time index food habits, glucose levels, and *MDA* levels, as well as smoking habits, significantly related to *MDA* levels. Recent studies show that *there is no significant difference in plasma MDA* levels in the 70-year-old and 60-year-old populations, but there is an increase in the specific activity of the catalase enzyme with age. Another study showed that there was a significant difference in plasma *MDA* levels in the non-metabolic syndrome obesity group compared to the obese group with metabolic syndrome.[20]

Based on the results of the Paired Samples t-test analysis, there was a significant difference in the decoction of bay leaf *(Syzygium Polyanthum)* to the reduction of systolic blood pressure in hypertensive elderly women due to the value of ρ (0.001). The results of the analysis of the Wilcoxon Signed Ranks Test showed a significant difference in the decoction of bay leaf *(Syzygium Polyanthum)* to a decrease in diastolic blood pressure in hypertensive elderly women due to a value of ρ (0.000). The results of the Paired Samples t-test analysis showed a significant difference in the administration of amlodipine in the reduction of systolic blood pressure in hypertensive elderly women due to the value of ρ (0.000).

The results of the analysis of the Paired Samples t-test showed a significant difference in the administration of amlodipine in the reduction of diastolic blood pressure in hypertensive elderly women due to the value of ρ (0.000). Based on the results of the analysis of the Independent Samples Test t-test, there was a significant effect of bay leaf decoction *(Syzygium Polyanthum)* on the reduction of systolic blood pressure in hypertensive elderly women due to the value of ρ (0.012) and there was a significant effect of bay leaf decoction *(Syzygium Polyanthum)* on the reduction of diastolic blood pressure in hypertensive elderly women due to the value of ρ (0.000).

Based on the results of data analysis using the Wilcoxon Signed Ranks Test statistical test, there was a significant difference in the decoction of bay leaf *(Syzygium Polyanthum)* on *MDA levels* in hypertensive elderly women due to a value of ρ (0.000) and there was a significant difference in the administration of amlodipine to *MDA levels* in hypertensive elderly women due to a value of ρ (0.000). Meanwhile, the results of the Mann-Whitney analysis showed the effect of Bay Leaf *Stew (Syzygium Polyanthum)* on the reduction of *MDA levels* in hypertensive elderly women due to the value of ρ (0.009).

This research has several advantages in its contribution to the development of health sciences, especially in the field of non-pharmacological therapies for hypertensive patients. One of its main advantages is the findings regarding the effectiveness of bay leaf decoction *(Syzygium polyanthum)* in lowering blood pressure and MDA levels in elderly women with hypertension. These findings indicate that bay leaves have the potential to be an alternative natural therapy to lower blood pressure, so they can help reduce dependence on chemical-based antihypertensive drugs. In addition, this research also enriches scientific understanding of the role of herbal plants in dealing with degenerative diseases. The use of laboratory tests to measure blood pressure and MDA levels also increases the validity of the findings, so the results of this study are worthy of reference and can be replicated in follow-up studies.

Nonetheless, this study has some limitations that must be considered. One of the limitations is the measurement of MDA levels with the TBARS test method, which has limitations in accuracy compared to more advanced

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methods such as *High-Performance Liquid Chromatography* (HPLC).

Another limitation is the non-measurement of other molecular parameters that play a role in the oxidative stress process, such as *Superoxide Dismutase* (SOD) and *Glutathione* (GSH). This causes the results of the study to not be able to provide a comprehensive picture of the mechanism of action of bay leaves as an antioxidant agent. The limited number of samples in hypertensive elderly women in one particular region limits the generalization of these findings to a wider population. The short duration of the intervention, which was only five days, was also an obstacle in evaluating the long-term effectiveness of the consumption of bay leaf decoction on reducing blood pressure and MDA levels.

The implications of this research are very broad, both in the academic field and, advanced research, and for the general public. In the academic world, the results of this research can be a reference for students and researchers who are interested in studies on the use of herbs for hypertension therapy and oxidative stress management. Further research can be carried out with more accurate methods and by measuring additional parameters to gain a more comprehensive understanding of the working mechanism of bay leaves. For the community, this study provides insight that bay leaves can be used as supportive therapy in controlling blood pressure naturally. Thus, this research not only provides benefits in the academic realm but also has a direct impact on improving public health.

CONCLUSION

Bay leaf decoction *(Syzygium polyanthum)* shows significant potential as an alternative to managing hypertension in elderly women. The consumption of bay leaf decoction effectively lowered the average systolic and diastolic blood pressure to 149.29 mmHg and 86 mmHg, better than the use of amlodipine. In addition, bay leaf decoction also reduced *MDA* levels by an average of 2.2035 nmol/mL compared to 2.7529 nmol/mL in amlodipine. Statistical analysis showed that bay leaf decoction had a significant effect on reducing systolic blood pressure, diastolic blood pressure, and MDA levels. These results support the use of bay leaves as a natural ingredient to lower blood pressure and oxidative stress, so it has the potential to be developed as a complementary therapy for the elderly with hypertension. It is expected to conduct further research with even more samples and more diverse research methods.

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