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Administration of Boiled Moringa Leaf Extract to Lower High Blood Pressure in Hypertensive Patients

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Abstract. Hypertension is a significant health issue as it serves as a major risk factor for various diseases, including heart disease, kidney failure, diabetes mellitus, and stroke. One pharmacological method that can help lower blood pressure is consuming boiled moringa leaf (Moringa oleifera) extract. This study aims to analyze the effects of consuming boiled moringa leaf extract on reducing blood pressure in individuals with hypertension in Sebauk Village, within the working area of Meskom Public Health Center, Bengkalis District. This study employed a case study method with a descriptive design. The research findings indicate that before consuming boiled moringa leaf extract, the systolic blood pressure of the respondents ranged from 145 mmHg to 165 mmHg, with an average of 152.81 mmHg. Meanwhile, the diastolic blood pressure ranged from 90 mmHg to 120 mmHg, with an average of 96.19 mmHg. After the administration of boiled moringa leaf extract, the systolic blood pressure of the respondents decreased, ranging from 130 mmHg to 160 mmHg, with an average of 138.44 mmHg. Additionally, the diastolic blood pressure dropped to a range of 80 mmHg to 100 mmHg, with an average of 85.31 mmHg. Based on these findings, it is recommended that Meskom Public Health Center educate the community about the risks of hypertension and its prevention and management, including consuming boiled moringa leaf extract as a natural alternative to help lower blood pressure.

Keywords: Blood Pressure, Boiled Moringa Leaf Extract, Hypertension.

1. BACKGROUND

Hypertension is one of the major health issues as it serves as a risk factor for various serious diseases such as heart disease, kidney failure, diabetes mellitus, and stroke (Maulia & Hengky, 2021). According to the World Health Organization (WHO), approximately 1.28 billion adults aged 30-79 years worldwide suffer from hypertension, with the majority (two-thirds) living in low- and middle-income countries. WHO also states that 46% of individuals with hypertension are unaware of their condition, while less than half (42%) have been diagnosed and treated. Only about 21% of people with hypertension can effectively control their blood pressure. Hypertension is a leading cause of premature death globally. Therefore, WHO has set a global target for non-communicable diseases to reduce the prevalence of hypertension by 33% between 2010 and 2030 (WHO, 2023).

According to the 2021 Basic Health Research (Riskesdas) data, approximately 36.1% of Indonesia's adult population suffers from hypertension. With an estimated adult population of 181 million, the number of people with hypertension is projected to reach around 65.4 million. This figure represents a significant increase compared to the 2013 Riskesdas data, which recorded a prevalence rate of 25.8%. The estimated number of hypertension cases in

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Indonesia is 63,209,620, with hypertension-related deaths reaching 427,218 (Ministry of Health of the Republic of Indonesia [Kemenkes RI], 2018; Riskesdas, 2018; Rispawati et al., 2023; Zahra & Siregar, 2023).

The 2018 Riskesdas report also indicated that the prevalence of hypertension in Riau Province exceeded the national average, with Bengkalis Regency ranking as the second highest in the province, recording 236,992 hypertension cases. This increasing trend poses a higher risk of complications, highlighting the need for continuous monitoring of hypertension awareness and medication adherence among patients. According to Riskesdas (2018), the main reasons for irregular or discontinued hypertension medication use include patients feeling healthy, frequently forgetting, experiencing uncomfortable side effects, and limited medication availability at healthcare facilities. This situation reflects that a significant number of hypertension patients are not compliant with their medication, which is crucial for effective blood pressure management (Riau Provincial Health Office [Dinkes], 2019; Zahra & Siregar, 2023; Hastutik et al., 2022; Novitasari, 2021; Riskesdas, 2018).

Hypertension ranks second in Riau Province with a prevalence of 236,992 people suffering from hypertension. This increase in incidence also poses a risk of increasing complications, so monitoring of hypertension knowledge and medication compliance in hypertensive patients is needed, according to Riskesdas (2018), the reasons why residents do not routinely and do not take hypertension medication are that patients feel healthy, often forget, cannot stand the side effects of drugs, and drugs are not available at community service facilities. This shows that there are still many hypertension sufferers who are not compliant in taking medication to control hypertension (Riau Province Health Office [Dinkes], 2019: Zahra and Siregar, 2023: Hastutik et al, 2022: Novitasari, 2021: Rikesdas, 2018).

Recent studies have identified several new risk factors that play a significant role in the development of hypertension, including genetic and epigenetic factors. One influential epigenetic mechanism involves modifications in gene expression that regulate blood pressure (Giri et al., 2023). Additionally, an imbalance in gut microbiota (dysbiosis) has been linked to hypertension, primarily through mechanisms related to inflammation and insulin resistance (Li et al., 2023). Long-term exposure to air pollution, particularly fine particulate matter (PM2.5), has also been shown to increase the risk of hypertension due to systemic inflammatory responses.

Most individuals with high blood pressure experience various signs and symptoms, although a small percentage may remain asymptomatic. This condition can lead to prolonged, unnoticed hypertension, eventually resulting in complications. Organ damage associated with

hypertension includes the heart, kidneys, brain, and eyes. Common symptoms experienced by individuals with hypertension include headaches, dizziness or migraines, a heavy sensation in the neck, difficulty sleeping, weakness, and fatigue (Wati, 2023).

Uncontrolled hypertension can lead to various serious and life-threatening complications, including coronary heart disease, stroke, heart failure, and chronic kidney disease, all of which contribute to increased global mortality and morbidity (Mensah et al., 2023). Additionally, hypertension is associated with a higher risk of dementia and cognitive impairment, as chronic high blood pressure can damage brain blood vessels, reduce blood flow, and cause neuronal damage (Iadecola & Davisson, 2023). This condition can also result in hypertensive retinopathy, which may lead to blindness if left untreated (Wong & Mitchell, 2023). The cumulative impact of uncontrolled hypertension underscores the importance of early detection, proper management, and adherence to therapy to prevent life-threatening complications.

2. THEORETICAL STUDY

Hypertension is a chronic disease characterized by an increase in blood pressure that can lead to severe complications such as heart disease, stroke, and kidney failure (WHO, 2023). Various pharmacological and non-pharmacological interventions have been developed to manage hypertension, including the use of medicinal plants. One of the natural remedies that has been studied for its antihypertensive effects is Moringa oleifera, commonly known as moringa leaves.

Moringa leaves contain bioactive compounds such as flavonoids, polyphenols, and alkaloids, which play a crucial role in reducing blood pressure. Studies suggest that moringa leaf decoction has antihypertensive properties due to its vasodilatory effects, which help relax blood vessels and improve blood circulation (Anwar et al., 2022). The high potassium content in moringa leaves also contributes to blood pressure reduction by counteracting the effects of sodium, a major factor in hypertension (Fahey, 2019).

Furthermore, moringa leaves exhibit strong antioxidant activity, which helps reduce oxidative stress—a key contributor to endothelial dysfunction and hypertension. The presence of quercetin, a flavonoid found in moringa leaves, has been shown to lower systolic and diastolic blood pressure by modulating nitric oxide production and improving vascular function (Saini et al., 2021).

A study by Oduro et al. (2020) demonstrated that regular consumption of moringa leaf decoction significantly lowered blood pressure in hypertensive individuals over a four-week

period. Another study by Aju et al. (2023) indicated that moringa extract improved endothelial function and reduced arterial stiffness, both of which are essential for maintaining healthy blood pressure levels.

Given these findings, moringa leaf decoction serves as a promising natural alternative for managing hypertension. Its ability to regulate blood pressure through multiple mechanisms, including vasodilation, sodium-potassium balance, and antioxidant effects, highlights its potential as a complementary therapy for hypertensive patients.

3. RESEARCH METHODS

This study employed a case study design with a descriptive analysis approach to examine the administration of *Moringa oleifera* decoction as an effort to reduce high blood pressure in hypertensive patients. The research was conducted in December 2024 in Sebauk Village, which falls under the working area of Meskom Public Health Center, Bengkalis District. The data analysis in this case study was carried out using a descriptive method, focusing on the effectiveness of *Moringa oleifera* decoction in lowering high blood pressure among hypertensive patients in Sebauk Village, Meskom Public Health Center, Bengkalis District. The analyzed data included measurements of systolic and diastolic blood pressure in hypertensive patients.

4. RESULTS AND DISCUSSION

Research result can seen in table 1.

Table 1. Research Results of Respondens Characteristic

Variabel	Sum (n)	Persentase (%)
Gender		
Man	5	31.3
Woman	11	68.7
Employment Status		
Working	6	37.5
Not Working	10	62.5

Table 2. Blood Pressure Measurement Results Before and After Moringa Leaf Decoction Administration

	Min Systolic (mmHg)	**Max Systolic (mmHg)**	**Mean Systolic (mmHg)**	**Min Diastolic (mmHg)**	**Max Diastolic (mmHg)**	**Mean Diastolic (mmHg)**
Pretest	145	165	152.81	90	120	96.19
Postest	130	160	138.44	80	100	85.31

Based on the research findings, it was found that the number of male respondents was 5 (31.3%), while female respondents accounted for 11 (68.7%). In terms of employment status, 6 respondents (37.5%) were employed, while 10 respondents (62.5%) were unemployed in Sebauk Village, the working area of Meskom Public Health Center, Bengkalis District.

The research results also showed that before consuming Moringa leaf decoction, the respondents' systolic blood pressure ranged from 145 mmHg to 165 mmHg, with an average of 152.81 mmHg. Meanwhile, diastolic blood pressure ranged from 90 mmHg to 120 mmHg, with an average of 96.19 mmHg.

After consuming Moringa leaf decoction, the respondents' systolic blood pressure decreased, with a minimum value of 130 mmHg and a maximum of 160 mmHg, with an average of 138.44 mmHg. Diastolic blood pressure also decreased, ranging from 80 mmHg to 100 mmHg, with an average value of 85.31 mmHg in Sebauk Village, the working area of Meskom Public Health Center, Bengkalis District.

The results of this study indicate that the administration of Moringa leaf (Moringa oleifera) decoction significantly reduces blood pressure in hypertensive patients. Before consuming Moringa leaf decoction, respondents' systolic blood pressure ranged from 145 mmHg to 165 mmHg, with an average of 152.81 mmHg, while diastolic blood pressure ranged from 90 mmHg to 120 mmHg, with an average of 96.19 mmHg. After consuming Moringa leaf decoction, there was a decrease in blood pressure, with systolic values ranging from 130 mmHg to 160 mmHg (mean 138.44 mmHg) and diastolic values ranging from 80 mmHg to 100 mmHg (mean 85.31 mmHg).

These findings align with previous research that highlights the antihypertensive properties of Moringa oleifera. According to Fahey (2005), Moringa leaves contain bioactive compounds such as flavonoids, polyphenols, and isothiocyanates, which have been shown to have cardioprotective and antihypertensive effects. A study conducted by Muhammad et al. (2020) found that Moringa leaf extract significantly reduced blood pressure in hypertensive rats by promoting vasodilation and improving endothelial function.

The mechanism behind the blood pressure-lowering effect of Moringa oleifera is primarily attributed to its rich content of antioxidants and bioactive phytochemicals. These compounds help reduce oxidative stress, a key contributor to hypertension (Aja et al., 2014). Additionally, Moringa has been found to enhance nitric oxide production, which plays a crucial role in vasodilation and blood pressure regulation (Chumark et al., 2008).

Furthermore, Moringa oleifera has been reported to have diuretic properties, which aid in reducing blood volume and subsequently lowering blood pressure (Oyeyemi et al., 2019).

This diuretic effect is comparable to conventional antihypertensive medications such as thiazide diuretics, which are commonly prescribed to manage hypertension (Murray et al., 2019).

The findings of this study emphasize the potential of Moringa leaf decoction as an alternative or complementary treatment for hypertension. However, it is important to note that while Moringa oleifera demonstrates significant antihypertensive effects, it should not be used as a sole treatment for hypertension without medical supervision. Patients with hypertension should continue following their prescribed treatments and lifestyle modifications as recommended by healthcare professionals.

Future research should explore the long-term effects of Moringa leaf consumption on blood pressure and its potential interactions with antihypertensive medications. Clinical trials involving larger sample sizes and randomized controlled trials are necessary to further validate these findings.

5. CONCLUSION

Based on the research findings, the consumption of Moringa oleifera decoction has been proven to lower blood pressure in individuals with hypertension. The significant reduction in both systolic and diastolic blood pressure after consuming the decoction indicates that this plant has potential as a natural therapy for managing hypertension. Therefore, Moringa oleifera decoction can serve as a complementary treatment alternative for hypertensive patients. However, further research is needed to confirm its long-term efficacy and safety.

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