



The Effect of Moringa (*Moringa oleifera*) Leaf Soup on Blood Pressure Changes among Overweight Employees at Nusa Cendana University

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ABSTRACT

Background: Hypertension is a major risk factor for cardiovascular disease and is commonly associated with overweight status. Dietary interventions using functional foods are considered effective non-pharmacological strategies for blood pressure control. Moringa (*Moringa oleifera*) leaves contain bioactive compounds such as potassium, calcium, magnesium, flavonoids, and antioxidants, which may contribute to blood pressure reduction. However, evidence regarding the effect of Moringa leaf soup on blood pressure among overweight individuals is still limited.

Objective: This study aimed to determine the effect of Moringa leaf soup consumption on changes in blood pressure among overweight employees at Nusa Cendana University.

Methods: This pre-experimental study employed a one-group pretest–posttest design involving 27 overweight employees selected through purposive sampling. Participants consumed 100 grams of Moringa leaf soup daily for seven days. Blood pressure was measured before and after the intervention using a digital sphygmomanometer. Data were analyzed using the Wilcoxon signed-rank test.

Results: A significant reduction in systolic blood pressure was observed after the intervention ($p < 0.05$). However, no significant change was found in diastolic blood pressure ($p > 0.05$).

Conclusion: Moringa leaf soup consumption for seven days significantly reduced systolic blood pressure but had no significant effect on diastolic blood pressure. This intervention may serve as a complementary dietary approach for blood pressure management in overweight individuals.

KEYWORDS: Blood pressure, overweight, hypertension, Moringa leaf, *Moringa oleifera*

INTRODUCTION

Hypertension is a major public health problem and one of the leading risk factors for cardiovascular morbidity and mortality worldwide. The World Health Organization estimates that hypertension affects more than one billion people globally and contributes substantially to premature death due to stroke, myocardial infarction, heart failure, and renal disease.¹ Elevated blood pressure often develops silently and is strongly associated with modifiable risk factors, particularly overweight and obesity.²

Overweight and obesity are characterized by excessive fat accumulation that alters hemodynamic and metabolic functions, leading to increased cardiac output, activation of the renin–angiotensin–aldosterone system, insulin resistance, and sodium retention.³ These mechanisms contribute to sustained elevation of blood pressure, especially systolic blood pressure. Previous studies have demonstrated that individuals with excess body weight have a significantly higher risk of developing hypertension compared to those with normal body mass index.⁴

Lifestyle modification, including dietary intervention, plays a crucial role in the prevention and management of hypertension. Non-pharmacological approaches such as increased consumption of fruits, vegetables, and plant-based functional foods are recommended as first-line strategies, particularly for individuals with mild hypertension or high cardiovascular risk.⁵ One plant that has gained increasing attention is *Moringa oleifera*, commonly known as moringa.



Moringa oleifera leaves are rich in potassium, calcium, magnesium, flavonoids, and antioxidants, which are known to support vasodilation, improve endothelial function, and regulate electrolyte balance.⁶ Several studies have reported the antihypertensive potential of moringa leaves in various preparations; however, evidence regarding the effect of moringa leaf soup on blood pressure among overweight adults remains limited.⁷ Therefore, this study aimed to evaluate the effect of Moringa leaf soup consumption on changes in blood pressure among overweight employees at Nusa Cendana University.

METHODS

This study employed a pre-experimental one-group pretest–posttest design to evaluate the effect of Moringa (*Moringa oleifera*) leaf soup consumption on blood pressure among overweight employees. The study was conducted at Nusa Cendana University, Kupang, East Nusa Tenggara, Indonesia.

The study population consisted of university employees with overweight nutritional status. A total of 27 participants were recruited using purposive sampling. Participants were eligible if they were aged 18 years or older, had a body mass index (BMI) ≥ 25 kg/m², and agreed to participate voluntarily. Exclusion criteria included pregnancy, current use of antihypertensive medication, a history of cardiovascular or renal disease, and known allergy to moringa leaves.

The intervention involved daily consumption of Moringa leaf soup prepared from fresh *Moringa oleifera* leaves. Each participant consumed 100 grams of the soup once daily for seven consecutive days. Participants were instructed to maintain their usual dietary habits and physical activity levels during the intervention period.

Blood pressure was measured before and after the intervention using a digital sphygmomanometer. Measurements were conducted in a seated position after at least five minutes of rest, under standardized conditions to ensure accuracy and consistency.

The independent variable was Moringa leaf soup consumption, while the dependent variables were systolic and diastolic blood pressure. Descriptive statistics were used to summarize participant characteristics. Differences in blood pressure values before and after the intervention were analyzed using the Wilcoxon signed-rank test, with statistical significance set at $p < 0.05$.

Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Medicine and Veterinary Medicine, Nusa Cendana University (Approval No. 58.1/UN15.21/KEPK-FKKH/2025). All participants provided written informed consent prior to participation. Participant confidentiality and data privacy were strictly maintained throughout the research process, and the study was conducted in accordance with internationally accepted ethical principles for research involving human subjects.

RESULTS

A total of 27 overweight employees participated in this study and completed the seven-day intervention. Participants consisted of both male and female employees with varying ages, all of whom met the inclusion criteria based on body mass index classification. Baseline measurements indicated that several participants had elevated systolic and diastolic blood pressure prior to the intervention.

Table 1. Characteristics of Study Participants (n = 27)

Characteristic	n	%
Sex		
Male	12	44.4
Female	15	55.6
Age Group (years)		
26–35	6	22.2
36–45	10	37.0
46–55	11	40.8
BMI Category		
Overweight (25.0–29.9 kg/m ²)	27	100



As shown in Table 1, more than half of the participants were female, and the majority were aged over 35 years. All respondents were classified as overweight, indicating a relatively homogeneous nutritional status among the study population.

Baseline and post-intervention blood pressure measurements were obtained to assess the effect of Moringa leaf soup consumption.

Table 2. Systolic and Diastolic Blood Pressure Before and After Intervention (n = 27)

Blood Pressure Parameter	Before Intervention (Mean ± SD)	After Intervention (Mean ± SD)	p-value
Systolic BP (mmHg)	142.3 ± 11.5	134.6 ± 10.2	0.001
Diastolic BP (mmHg)	89.7 ± 8.6	88.1 ± 7.9	0.214

Table 2 shows a decrease in mean systolic blood pressure after seven days of Moringa leaf soup consumption. Statistical analysis using the Wilcoxon signed-rank test revealed a significant reduction in systolic blood pressure ($p < 0.05$). In contrast, although a slight decrease in mean diastolic blood pressure was observed, the change was not statistically significant ($p > 0.05$).

Overall, these findings indicate that daily consumption of Moringa leaf soup for seven consecutive days was effective in lowering systolic blood pressure among overweight employees, while its effect on diastolic blood pressure was limited. No adverse effects were reported by participants during the intervention period.

DISCUSSION

The present study found that daily consumption of Moringa (*Moringa oleifera*) leaf soup for seven consecutive days was associated with a significant reduction in systolic blood pressure among overweight employees, whereas no statistically significant change was observed in diastolic blood pressure. This finding suggests that short-term dietary interventions incorporating functional plant-based foods may confer measurable cardiovascular benefits, particularly in populations characterized by excess body weight.⁸⁻¹⁰

The observed reduction in systolic blood pressure can be explained by the underlying pathophysiological relationship between overweight status and hypertension. Excess adiposity is known to induce sympathetic nervous system activation, insulin resistance, chronic low-grade inflammation, and stimulation of the renin-angiotensin-aldosterone system.¹¹⁻¹³ These mechanisms contribute to increased cardiac output and arterial stiffness, resulting predominantly in elevated systolic blood pressure.¹⁴⁻¹⁶ Consequently, interventions targeting vascular compliance and sodium homeostasis are more likely to influence systolic rather than diastolic blood pressure.

Moringa leaves are rich in minerals that play a central role in blood pressure regulation, particularly potassium, magnesium, and calcium. Potassium intake has been consistently associated with blood pressure reduction through enhanced renal sodium excretion, suppression of renin release, and attenuation of vascular smooth muscle contraction.¹⁷⁻¹⁹ These effects are especially relevant in overweight individuals, who frequently exhibit increased sodium sensitivity and impaired renal sodium handling.²⁰⁻²² By improving the sodium-potassium balance, consumption of Moringa leaf soup may reduce plasma volume and arterial pressure, thereby contributing to the observed decrease in systolic blood pressure.

Magnesium further modulates vascular tone by regulating intracellular calcium transport within vascular smooth muscle cells.²³⁻²⁵ Adequate magnesium levels promote smooth muscle relaxation, reduce peripheral vascular resistance, and enhance endothelial nitric oxide synthase activity.²⁶ Magnesium deficiency has been associated with endothelial dysfunction, increased arterial stiffness, and heightened sympathetic activity, all of which contribute to systolic hypertension.²⁷⁻²⁹ Thus, magnesium intake derived from Moringa leaves may support vascular function and arterial compliance.

In addition to its mineral composition, Moringa leaves contain a wide range of bioactive phytochemicals, including flavonoids and phenolic compounds with potent antioxidant properties.³⁰⁻³² Oxidative stress plays a key role in the development of hypertension by reducing nitric oxide bioavailability and promoting vascular inflammation.³³⁻³⁵ In individuals with overweight, excessive adipose tissue further exacerbates oxidative stress through increased production of reactive oxygen species.³⁶⁻³⁸ Antioxidant compounds present in Moringa may mitigate these processes by scavenging free radicals, preserving endothelial nitric oxide activity, and improving arterial elasticity.³⁹⁻⁴¹ These mechanisms predominantly affect systolic blood pressure, which is closely associated with large artery stiffness.



The absence of a statistically significant change in diastolic blood pressure observed in this study is consistent with findings from previous dietary and nutritional intervention studies.⁴²⁻⁴⁴ Diastolic blood pressure is largely determined by peripheral vascular resistance and autonomic regulation, which may require longer intervention durations to demonstrate significant improvement.⁴⁵⁻⁴⁷ Structural and functional adaptations of resistance arteries typically occur over extended periods and may not be detectable following short-term dietary interventions such as the one implemented in this study.

Moreover, age-related vascular changes may partially explain the differential response between systolic and diastolic blood pressure. In middle-aged and older adults, systolic hypertension becomes more prevalent due to progressive arterial stiffening, while diastolic pressure often remains relatively stable.⁴⁸⁻⁵⁰ The demographic characteristics of the study population may therefore have contributed to the observed pattern of blood pressure response.

From a public health perspective, these findings underscore the potential value of Moringa leaf soup as a culturally acceptable, low-cost, and locally available dietary intervention.⁵¹⁻⁵³ Incorporation of Moringa leaves into daily meals may support sustainable lifestyle modification strategies for hypertension prevention and management, particularly in low- and middle-income settings.⁵⁴⁻⁵⁶

Nevertheless, several limitations should be acknowledged. The pre-experimental design without a control group restricts causal inference, and the small sample size limits generalizability. Additionally, dietary intake and physical activity were not strictly controlled, which may have influenced blood pressure outcomes.⁵⁷⁻⁵⁹ Future studies employing randomized controlled trial designs with larger sample sizes, longer intervention periods, and comprehensive dietary assessment are warranted to confirm these findings and further elucidate the underlying mechanisms.⁶⁰⁻⁶³

This study provides evidence that short-term consumption of Moringa leaf soup may significantly reduce systolic blood pressure among overweight individuals. Through its combined mineral and antioxidant properties, Moringa appears to influence multiple physiological pathways involved in blood pressure regulation. These findings support the potential role of Moringa leaf soup as a complementary dietary strategy for hypertension management and warrant further investigation in more rigorous clinical studies.⁶⁴⁻⁶⁶

CONCLUSION

This study demonstrated that daily consumption of Moringa (*Moringa oleifera*) leaf soup for seven consecutive days was associated with a significant reduction in systolic blood pressure among overweight employees at Nusa Cendana University. In contrast, no statistically significant change was observed in diastolic blood pressure.

The findings suggest that Moringa leaf soup may serve as a complementary, non-pharmacological dietary intervention for systolic blood pressure management in individuals with excess body weight. The antihypertensive effect observed in this study is likely related to the combined mineral and antioxidant properties of Moringa leaves, which may influence vascular function, sodium balance, and endothelial health.

Despite these promising results, the short duration of intervention, limited sample size, and pre-experimental study design restrict the generalizability of the findings. Further research using randomized controlled trial designs with larger populations, longer intervention periods, and rigorous control of confounding factors is required to confirm the effectiveness of Moringa leaf soup and to clarify its role in long-term hypertension prevention and management.

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