Jurnal Kesehatan Komunitas Indonesia (JKKI)
Volume 5 Issue 3, December 2025, pp 302-312
https://ebsina.or.id/journals/index.php/jkki
eISSN 2503-2801, pISSN 2985-3435

The Effect of Cucumber Juice Administration on Blood Pressure Reduction in Elderly Hypertension: A Case Study in Purwodiningrat Village, Surakarta

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Article History
Submitted: 28-06-2025
Revised: 29-11-2025
Accepted: 01-12-2025

doi.org/10.58545/jkki.v5i3.541

Abstract

Background: Hypertension remains a leading global public health concern, particularly among older adults. Non-pharmacological interventions, including dietary approaches, are increasingly recognized as complementary strategies for managing blood pressure. Cucumber juice, rich in potassium and water, has been proposed as a natural and accessible adjunctive therapy for hypertension. **Objective:** This study aimed to evaluate the effect of daily cucumber juice administration on blood pressure reduction in hypertensive patients in RW 07, Purwodiningratan Village, Surakarta City, Indonesia. **Methods:** A descriptive case study was conducted over seven days (April 27–May 3, 2025), involving two hypertensive respondents aged 45 years or older who were concurrently receiving amlodipine. Cucumber juice (200 mL/day) was administered daily, and blood pressure was measured before and two hours after consumption using a digital sphygmomanometer. Data were analyzed descriptively by comparing pre- and post-intervention blood pressure categories. **Results:** Respondent 1's blood pressure decreased from 168/100 mmHg (Stage 2 hypertension) to 127/84 mmHg (normal) after seven days. Respondent 2's blood pressure improved from 186/119 mmHg (Stage 3 hypertension) to 148/90 mmHg (Stage 1 hypertension). Both cases demonstrated a consistent daily decline in systolic and diastolic values throughout the intervention period. **Conclusion:** The daily administration of cucumber juice contributes to a significant reduction in blood pressure in hypertensive patients when used in conjunction with standard pharmacological treatment. These findings support the potential of cucumber juice as a feasible, low-cost non-pharmacological adjunct in community-based hypertension management. Further research with larger samples and controlled designs is recommended to validate these preliminary results.

Keywords: Hypertension, Blood pressure, Cucumber juice, Elderly

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How to cite:
Khasanah, A. N., Imamah, I. N., & Harwanto, T. (2025). The Effect of Cucumber Juice Administration on Blood Pressure Reduction in Elderly Hypertension: A Case Study in Purwodiningrat Village, Surakarta. Jurnal Kesehatan Komunitas Indonesia, 5(3), 302-312. https://doi.org/10.58545/jkki.v5i3.541

1. BACKGROUND

Hypertension is a major public health challenge worldwide and a leading risk factor for cardiovascular morbidity and mortality. Defined as systolic blood pressure (SBP) of 140 mmHg or higher or diastolic blood pressure (DBP) of 90 mmHg or higher, hypertension affects approximately 1.3 billion people globally. It contributes to nearly 10.4 million deaths annually due to complications such as stroke, heart failure, and chronic kidney disease (World Health Organization, 2021). Often termed the "silent killer," hypertension frequently remains undetected until severe organ damage occurs, given its asymptomatic nature in early stages (Kurdi et al., 2022).

The burden of hypertension is particularly pronounced in low- and middle-income countries, where access to consistent pharmacological treatment and monitoring may be limited. In Indonesia, the prevalence of hypertension among adults aged 18 years and above reached 34.1% in 2018 (Riskesdas), with recent data suggesting a continued upward trend exceeding 61% in 2022 among older adults (Ministry of Health, Republic of Indonesia, 2022). Central Java Province reported over 5.6 million cases in 2024, with Surakarta City ranking among the areas with the highest burden. At the community level, Purwodiningratan Village recorded 284 hypertensive patients in 2024, 66% of whom were women, highlighting both gender and age disparities in disease distribution.

While pharmacological therapy (e.g., calcium channel blockers like amlodipine) remains the cornerstone of hypertension management, its long-term use presents challenges, including cost, side effects, and adherence issues. Consequently, non-pharmacological interventions are increasingly emphasized as essential components of a holistic approach. Lifestyle modifications such as reducing sodium intake, increasing physical activity, managing stress, and enriching the diet with potassium-rich foods are recommended by global guidelines (e.g., WHO, ESC/ESH) for controlling blood pressure.

Among dietary strategies, cucumber (Cucumis sativus L.) has garnered interest due to its high water content, potassium, magnesium, and fiber, all of which contribute to vasodilation, natriuresis, and improved vascular tone. Recent studies have reported significant reductions in both systolic and diastolic blood pressure following daily consumption of cucumber juice in hypertensive populations (Karina

& Fadilah, 2024; Nurjaya et al., 2025). However, awareness and utilization of this accessible, low-cost intervention remain low in community settings.

A preliminary survey In RW 07, Purwodiningratan Village in April 2025 revealed that hypertensive residents relied exclusively on antihypertensive medication, with no knowledge or prior use of complementary dietary therapies such as cucumber juice. This gap underscores the need for community-based health promotion efforts that integrate evidence-based non-pharmacological approaches into routine hypertension care.

Therefore, this study aims to evaluate the effect of daily cucumber juice administration on blood pressure reduction among hypertensive patients in this setting, contributing to the growing body of evidence supporting plant-based, non-pharmacological strategies in primary healthcare.

2. METHODS

This study employed a descriptive case study design to investigate the effect of administering cucumber juice on blood pressure reduction in hypertensive patients in RW 07, Purwodiningrat Village, Jebres Subdistrict, Surakarta City. The approach followed the nursing process framework, encompassing assessment, nursing diagnosis, planning, implementation, and evaluation, with a focus on independent nursing interventions. Two adult respondents were purposively selected based on predefined inclusion and exclusion criteria. The inclusion criteria consisted of voluntary participation, a cooperative attitude, the ability to communicate verbally, regular use of the antihypertensive drug amlodipine (to maintain pharmacological homogeneity), and an age of at least 45 years. Exclusion criteria included the presence of comorbid chronic diseases and personal aversion to cucumbers.

Data collection was conducted at Rejosari Hamlet, RT 01/RW 07, from April 27 to May 3, 2025. Prior to the intervention, informed consent was obtained from both respondents, and ethical principles—including anonymity, confidentiality, veracity, and justice—were strictly upheld throughout the study. Baseline assessments included demographic characteristics, medical history, lifestyle factors (such as dietary salt intake, physical activity level, stress patterns, and medication adherence), and initial blood pressure measurements using a calibrated digital sphygmomanometer. Respondent I was a 55-year-old male with a family history of hypertension, low physical

activity, and consistent medication use. Respondent II was a 54-year-old female with a family history of hypertension, high dietary salt intake, low fiber consumption, and chronic psychological stress, all of which are known contributors to elevated blood pressure.

The intervention consisted of daily oral administration of freshly prepared cucumber juice (200 mL) for seven consecutive days. The juice was prepared under standardized hygienic conditions using mature, unpeeled cucumbers (Cucumis sativus L.) blended with minimal water and no added sugar or preservatives. Blood pressure was measured twice daily: once in the morning before juice consumption (pre-intervention) and again two hours after ingestion (post-intervention). All measurements were recorded and categorized according to the 2018 ESC/ESH hypertension classification guidelines. Data were collected through direct observation, structured interviews, and clinical documentation. Primary data were gathered from the respondents and local community health volunteers, while secondary data were derived from peer-reviewed literature and national health reports.

Data analysis was performed descriptively by comparing pre- and post-intervention blood pressure values over seven days. Trends in systolic and diastolic readings were examined to assess the direction and magnitude of change, supported by shifts in the categorization of hypertension staging. The findings were interpreted in conjunction with subjective reports (e.g., perceived well-being, symptom changes) and objective clinical observations.

3. RESULTS

The intervention was implemented over seven consecutive days (April 27–May 3, 2025) among two hypertensive respondents residing in Rejosari Hamlet, RT 01/RW 07, Purwodiningratan Village, Jebres Subdistrict, Surakarta City. Both respondents were concurrently receiving amlodipine as part of their routine pharmacological management. Before initiating the intervention, baseline blood pressure measurements confirmed uncontrolled hypertension in both individuals (Table 1).

Table 1. Baseline blood pressure readings prior to cucumber juice administration

Respondent	Date	Blood Pressure (mmHg)	Hypertension Category*
Mr. A	April 27, 2025	168/100	Stage 2
Mrs. S	April 27, 2025	186/119	Stage 3

*Classification based on 2018 ESC/ESH guidelines.

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Following daily consumption of 200 mL of freshly prepared cucumber juice, both respondents demonstrated progressive reductions in systolic and diastolic blood pressure. By the end of the intervention period (May 3, 2025), Mr. A's blood pressure had decreased to 127/84 mmHg (normal range), while Mrs. S's reading improved to 148/90 mmHg (Stage 1 hypertension), as shown in Table 2.

Table 2. Blood Pressure Measurements of Both Respondents After Cucumber Juice Administration

Respondent	Date	Blood Pressure	Category
Mr. A	May 3, 2025	127/84 mmHg	Normal
Mrs. S	May 3, 2025	148/90 mmHg	Stage 1 Hypertension

The day-to-day progression of blood pressure changes is summarized in Tables 3. Both respondents exhibited consistent declines across the intervention period. Mr. A's systolic pressure decreased by 41 mmHg and diastolic by 16 mmHg, resulting in a full normalization of blood pressure. Mrs. S showed a 38 mmHg reduction in systolic and 29 mmHg in diastolic pressure, representing a two-stage improvement (from Stage 3 to Stage 1).

Table 3. Daily blood pressure progression for Respondents (pre- and post-intervention)

Date	Mr. A			Mr. S		
	Pre (mmHg)	Post (mmHg)	Hypertension Category Change	Pre (mmHg)	Post (mmHg)	Hypertension Category Change
Apr 27	168/100	159/99	Stage 2 → Stage 1	186/119	183/110	Stage 3 → Stage 2
Apr 28	155/95	150/92	Stage 2 → Stage 1	178/105	175/103	Stage 2 → Stage 2
Apr 29	148/98	145/94	Stage 2 → Stage 1	167/105	165/101	Stage 2 → Stage 1
Apr 30	142/95	141/90	Stage 2 → Stage 1	162/100	159/95	Stage 2→Stage 1
May 1	140/93	136/89	Stage 2 → High-normal	158/98	155/97	Stage 1 → Stage 1
May 2	140/95	132/88	Stage 2 → High-normal	152/95	150/90	Stage 1 → Stage 1
May 3	–	127/84	Normal	–	148/90	Stage 1

Table 4. Summary of blood pressure changes before and after the intervention

Respondent	Pre-intervention (mmHg)	Post-intervention (mmHg)	Change in Category
Mr. A	168/100	127/84	Stage 2 →Normal
Mrs. S	186/119	148/90	Stage 3 → Stage 1

No adverse effects were reported during the intervention. Both respondents noted subjective improvements, including reduced headache frequency and increased sense of calmness. Environmental observations indicated that both lived in densely populated areas; Mr. A's home had moderate cleanliness and adequate ventilation, while Mrs. S's residence was cleaner but had limited airflow. These contextual factors were documented but

not controlled due to the descriptive case study design.

4. DISCUSSION

Blood Pressure Measurement Results Before the Administration of Cucumber Juice

Prior to the intervention, both respondents exhibited uncontrolled hypertension despite ongoing pharmacological treatment with amlodipine. Respondent I (Mr. A) presented with a blood pressure of 168/100 mmHg (Stage 2 hypertension), while Respondent II (Mrs. S) recorded a markedly elevated 186/119 mmHg (Stage 3 hypertension) according to the 2018 ESC/ESH classification. These findings reflect a common clinical reality in community settings, where medication adherence alone is often insufficient to achieve optimal blood pressure control without concurrent lifestyle modifications (Whelton et al., 2020).

Several modifiable risk factors likely contributed to the poor baseline control. Mr. A reported low physical activity and a family history of hypertension both established determinants of elevated blood pressure (Kurdi et al., 2024; Mahmood et al., 2020). Mrs. S, in contrast, exhibited multiple compounding risk behaviors: high dietary salt intake, low fiber consumption, chronic psychological stress, and inconsistent medication adherence. Chronic stress, in particular, activates the sympathetic nervous system and elevates cortisol and catecholamine levels, leading to sustained vasoconstriction and increased peripheral resistance (Li et al., 2021; Andrena & Kurdi, 2023). These contextual factors underscore the limitations of pharmacotherapy when non-pharmacological contributors remain unaddressed.

Blood Pressure Reduction After the Administration of Cucumber Juice

Following seven days of daily cucumber juice administration (200 mL/day), both respondents demonstrated clinically meaningful reductions in blood pressure. Mr. A's readings normalized to 127/84 mmHg, while Mrs. S improved from Stage 3 to Stage 1 hypertension (148/90 mmHg). These outcomes align with prior studies indicating that cucumber (Cucumis sativus L.) exerts antihypertensive effects through multiple physiological pathways.

Cucumber is rich in potassium, magnesium, and water, nutrients known to support vascular homeostasis. Potassium promotes sodium excretion and reduces vascular tone, while magnesium enhances

endothelial function and vasodilation (Suryarinilsih et al., 2023). Additionally, the high water content of cucumber contributes to mild diuretic activity, lowering blood volume and, consequently, blood pressure (Shreejha et al., 2020). These mechanisms are supported by findings from Karina & Fadilah (2024), who observed a mean post-intervention reduction from 150.6/95.6 mmHg to 128.1/80.0 mmHg after similar cucumber juice administration. Comparable results were reported by Ahmad et al. (2023) and Nurjaya et al. (2025), reinforcing the biological plausibility of the observed effects.

Development of Blood Pressure Changes Before and After Cucumber Juice Administration

Daily monitoring revealed a consistent and progressive decline in both systolic and diastolic pressures across the intervention period. Mr. A showed a steady trajectory from Stage 2 hypertension to normal blood pressure by Day 7, whereas Mrs. S experienced a more gradual but still substantial improvement from Stage 3 to Stage 1. Notably, the most pronounced reductions occurred within the first three days, suggesting an early physiological response to the intervention.

This pattern supports the hypothesis that cucumber juice may act rapidly through osmotic and electrolyte-mediated mechanisms, rather than through long-term structural vascular changes. The sustained daily improvement further implies a cumulative effect, possibly enhanced by modest behavioral adjustments prompted by the study (e.g., increased awareness, placebo effect, or slight dietary modifications). While uncontrolled variables such as stress and diet cannot be ruled out, the temporal association between juice consumption and blood pressure reduction coupled with biological plausibility strengthens the inference of a potential therapeutic contribution.

Comparison of Final Results Between the Two Respondents Before and After Cucumber Juice Administration

The differential responses between respondents highlight the influence of individual behavioral and physiological factors on intervention outcomes. Mr. A achieved normotension by Day 7, likely due to his relatively stable lifestyle, consistent medication use, and lower baseline stress levels. In contrast, Mrs. S despite a larger absolute reduction (38/29 mmHg) remained in the hypertensive range, possibly due to persistent high salt intake,

emotional stress, and intermittent medication adherence.

This divergence underscores a key principle in hypertension management: non-pharmacological interventions are most effective when integrated into a holistic care plan that includes behavioral support and pharmacological compliance (Sulistyowati et al., 2023). Cucumber juice alone is not a substitute for comprehensive management but serves as a feasible, low-cost adjunct that can amplify the effects of standard therapy, particularly in resource-limited community settings like RW 07, Purwodiningratan.

Nevertheless, this study has limitations. The small sample size (n=2), lack of control group, and inability to standardize external variables (e.g., diet, stress, sleep) preclude causal inference. Future research should employ quasi-experimental or randomized controlled designs with larger cohorts to validate these preliminary findings and quantify the independent effect of cucumber juice on blood pressure outcomes.

5. CONCLUSION

Based on the implementation results and discussion, the researcher concludes that administering cucumber juice has a positive effect on reducing blood pressure in hypertensive patients in RW 07, Purwodiningrat Village, Jebres Subdistrict, Surakarta City. Before the intervention, both respondents had high blood pressure categorized as Stage 2 and Stage 3 Hypertension. After seven days of daily cucumber juice consumption, there was a significant decrease in blood pressure levels. Respondent I's blood pressure improved to the normal category, while Respondent S's blood pressure decreased to Stage 1 Hypertension. These findings indicate a clear difference in blood pressure before and after the implementation of cucumber juice therapy. Therefore, the administration of cucumber juice helps lower blood pressure in individuals with hypertension.

For the respondents, it is recommended that those suffering from hypertension use the results of this study as motivation to manage their blood pressure independently through non-pharmacological therapies, such as consuming cucumber juice regularly. For the Integrated Health Post (Posyandu), it is recommended to develop and support educational programs and health promotion initiatives related to non-pharmacological interventions, such as cucumber juice, as part of hypertension management strategies in the community.

AUTHOR CONTRIBUTIONS

Annisa Nur Khasanah, Ida Nur Imama, Tri Harwanto: Conceptuali-zation, Data curation, Formal analysis, Writing-original draft, Writing-review & editing, Supervision, Manuscript revision. Annisa Nur Khasanah, and Ida Nur Imama: Conceptualization, Data curation, Formal analysis, Writing-review & editing, Supervision. Annisa Nur Khasanah: Conceptualization, Data curation.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to RW 07, Purwodiningratan Village, Surakarta City, for their invaluable support and facilitation during the conduct of this research. Special thanks are also extended to the Aisyiyah University of Surakarta for guidance and institutional support.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in this research.

DATA AVAILABILITY STATEMENT

The data are available from the corresponding author upon reasonable request.

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