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Original Article

# Blood Pressure Reduction in Patients with Hypertension through Soursop Leaf Tea Consumption

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## Abstract

**Background:** Controlling hypertension through pharmacological treatment is effective but can potentially lead to long-term side effects. Thus, more patients with hypertension have turned to herbal plants for treatment. The objective of this study was to examine the effectiveness of soursop leaf tea in reducing blood pressure in patients with hypertension.

**Methods:** This study employed a quasi-experimental approach with a non-randomized pretest-posttest control group design, involving 30 participants in the intervention group and 30 participants in the control group. Data was analyzed using the Wilcoxon test to assess the disparity in mean blood pressure levels before and after consumption of soursop leaf tea. The Mann-Whitney test was used to examine the distinction in mean blood pressure between the intervention group and the control group.

**Results:** In the intervention and control groups, most respondents were aged 56–65 years (60% and 66.7%), male (70% and 56.7%) and had suffered from hypertension for more than 5 years (70% and 56.7%). There was a significant difference in systolic blood pressure ($p<0.001$) and diastolic blood pressure ($p<0.001$) before and after the administration of soursop leaf tea. The mean systolic and diastolic blood pressure in the intervention group decreased significantly compared to the control group ($p<0.001$).

**Conclusion:** Consumption of soursop leaf tea can reduce systolic and diastolic blood pressure, suggesting that this local herb has a potential effect on individuals diagnosed with hypertension. The success of pharmacological control of hypertension needs to be supported by a healthy lifestyle.

**Keywords:** Blood pressure, hypertensive patients, soursop leaf tea

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## Introduction

Hypertension is a global health issue and has become a contributing factor to the increased risk of cardiovascular disease, including stroke and coronary heart disease.[1] Hypertension is characterized by a persistent increase in systolic and diastolic blood pressure levels to >140/90 mmHg.[2] Hypertension onset might occur due to the interaction of several risk factors, such as genetics, unhealthy lifestyle, age, gender, obesity, alcohol consumption, and a family history of hypertension.[3–6] Globally, there are estimated to be more than 1 billion people with hypertension, with the highest prevalence in developing countries.[7,8] The African region ranks first (27%), while the Southeast Asian region ranks third.[9] In Indonesia, there was a notable increase in the prevalence of hypertension in 2018. The incidence of hypertension in the age group of 18–24 year was 13.2%, 25–34 year was 20.1%, and 35–44 year was 31.6%.[10]

The management of hypertension typically involves pharmacological interventions, which includes the administration of medications such as angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, calcium blockers, and diuretics. These medications are used to control and regulate blood pressure levels in individuals with hypertension.[11] Antihypertensive medications are effective

but have the potential to cause long-term side effects such as loop diuretics (myalgia, hypokalemia, hyperglycemia), beta-blockers (insomnia, asthma symptoms), calcium channel blockers (CCBs) (palpitations, headaches, constipation, dizziness, pedal edema), and angiotensin-converting enzyme inhibitors (ACEIs) (chronic dry cough, lung cancer, kidney damage).[12–17] The success of pharmacological control of hypertension needs to be supported by a healthy lifestyle. Additionally, regular physical activity with a specific durations is also necessary.[18,19] This has encouraged a growing trend in the utilization of herbal medicines by hypertensive patients.[20]

One of the herbal plants that can be utilized to control hypertension is soursop (*Annona muricata*). Another study found that the hypotensive effect of soursop leaf extract involves the blockade of calcium ion with potassium ion channel, which significantly decreases blood pressure in Sprague-Dawley rats.[21] Another study reported the effectiveness of soursop leaf tea in reducing blood pressure in young adult men with hypertension. The average systolic blood pressure decreased from 116.94 mmHg to 106.04 mmHg, while the diastolic blood pressure decreased from 76.47 mmHg to 70.07 mmHg.[22] *Annona muricata* fruit extract showed evidence of antioxidant and antihypertensive effects through angiotensin-I converting enzyme inhibition in vitro.[23]

Based on previous studies and identification of intervention gaps, it was found that previous studies only focused on intervention studies using soursop leaf extract to reduce blood pressure in hypertensive patients, but very few studies focused on interventions using soursop tea made from chopped soursop leaves. Soursop leaves are processed into chopped form and boiled for 15 minutes to extract high-quality content from the leaves.[24]

A preliminary survey conducted at the Ajijulu Village Public Health Center Tigapanah Sub-District, Tanah Karo District, North Sumatra Province, Indonesia revealed that in 2018, there were 190 individuals (8.5%) suffering from hypertension. The number of individuals with hypertension increased in 2019 and 2020 to 240 (10.7%) and 280 (12.5%) respectively. From interviews with seven patients with hypertension, it was found that respondents had never consumed soursop tea to lower blood pressure because they were unaware of the benefits and how to prepare it. They still rely on generic medication prescribed by doctors, even though soursop tea is an alternative herbal treatment for reducing blood pressure in hypertensive sufferers. This study aimed to explore the effectiveness of soursop leaf tea in reducing blood pressure in patients with hypertension.

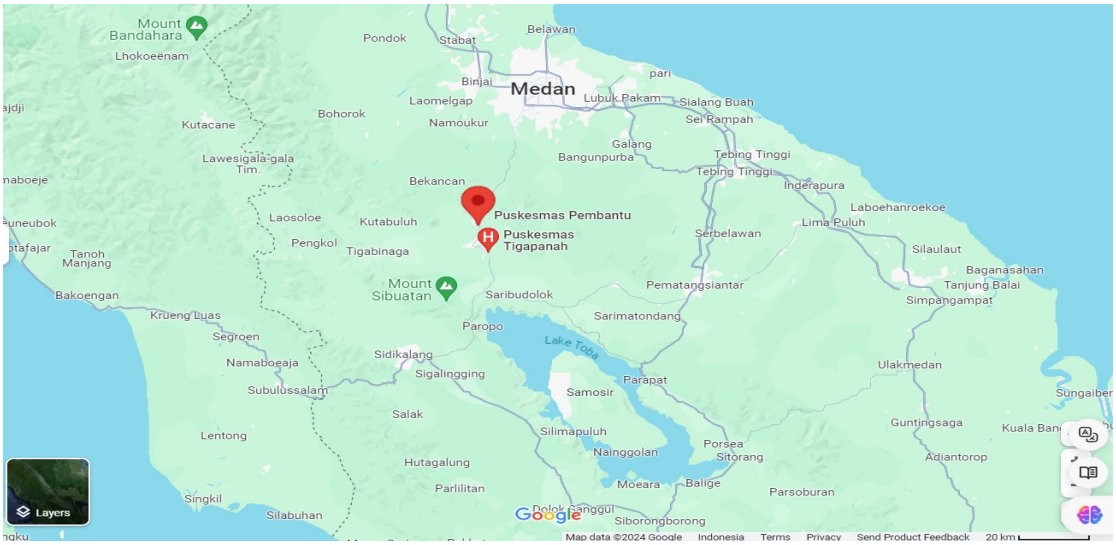


**Figure 1 Map of the Ajijulu Village Public Health Center, Tigapanah Sub-District, Tanah Karo District, North Sumatra Province, Indonesia***

Note: *Source: https://www.google.com/maps/search/Puskesmas+Pembantu+Tigapanah/@3.0974031,98.0276745,9z?entry=ttu

**(A) Step 1–3** **(B) Step 4–5**

**(C) Step 6** **(D) Step 7**

**Figure 2 Procedure for Making Soursop Leaf Tea**

## Methods

This study employed a quasi-experimental approach with a non-randomized pretest-posttest control group design involving 280 patients with hypertension at the Ajijulu Village Public Health Center, Tigapanah Sub-District, Tanah Karo District, North Sumatra Province, Indonesia. The study took place from 1st to 14th July 2022 and obtained an ethical approval from the Research Ethics Committee of Universitas Prima Indonesia no. 045/KEPK/UNPRI/XI/2021.

The sample size was calculated using a 95% confidence level and 90% test power, with Zα= 1.64, Zβ= 1.28, (X1-X2)= 2, and standard deviation (SD)= 4, resulting in a sample size of 30 patients in both the intervention and control groups. The study participants were recruited using a non-random sampling technique. The inclusion criteria for this study were patients with hypertension aged ≥45 years who had been diagnosed by a doctor, had complete data in the medical records of the Ajijulu Village Health Center, and were willing to participate in consuming soursop leaves during the study. The exclusion criteria were patients with severe complications who could not be interviewed. Blood pressure was measured before and after the intervention.

After consent, patients in the intervention group had consumed soursop tea once a day (1 glass approximately 200 ml) in the morning for 14 days. The procedure for making soursop leaf tea was as follows: (1) Preparation of soursop leaf tea, all tools and materials used such as 8 clean and undamaged soursop leaves, stainless steel for boiling the soursop leaves, an oven for drying, cups, measuring glasses, observation sheets, and a sphygmomanometer were prepared, (2) Clean and undamaged soursop leaves were selected for use, (3) Soursop leaves were cleaned to ensure their safety for consumption, (4) Soursop leaves were then cut into small pieces to reduce size and speed up the drying process, (5) The cut soursop leaves were dried on a stainless-steel surface placed in a shady area.

**Table 1 Characteristics of Patients with Hypertension**

| Variable | Intervention | | Control | |
|---|---|---|---|---|
| | n | % | n | % |
| Age | | | | |
| 45–55 years | 12 | 40 | 10 | 33.3 |
| 56–65 years | 18 | 60 | 20 | 66.7 |
| Gender | | | | |
| Male | 21 | 70 | 17 | 56.7 |
| Female | 9 | 30 | 13 | 43.3 |
| Occupation | | | | |
| Farmer | 10 | 33.3 | 16 | 53.3 |
| Employee | 18 | 60 | 13 | 43.3 |
| Civil servant | 2 | 6.7 | 1 | 3.3 |
| Long suffering | | | | |
| ≤5 years | 9 | 30 | 13 | 43.3 |
| >5 years | 21 | 70 | 17 | 56.7 |

The drying process was carried out for 8 hours to ensure the quality of the soursop leaves. The purpose of this drying process was to reduce the moisture content in soursop leaves and increase the active compounds contained in the leaves, (6) Finally, the soursop leaves were boiled in 3 cups of water (600 ml) for 15 minutes, (7) Boiled soursop leaves were poured into 1 glass containing approximately 200 ml. The procedure for making soursop leaf tea was shown in Figure 2.

Data analysis for this study was conducted to calculate the mean values of systolic and diastolic blood pressure between the intervention and control groups. This study used STATCAL statistical software, a free statistical application program for data analysis. Prior to data analysis, the initial step was to test the normality of the data using the Shapiro-Wilk test. The results showed that the data did not have a normal distribution ($p<0.05$). Subsequently, the Wilcoxon test was used to examine the differences in mean blood pressure before and after consuming soursop tea. The Mann-Whitney test was then employed to compare the mean blood pressure between the intervention and control groups.

## Results

The characteristics of the respondents in the intervention and control groups showed that the majority of respondents were aged 56–65 years, 60% and 66.7% respectively. Based on gender, most respondents were male, 70% and 56.7% respectively, worked as employees and farmers, 60% and 53.3% respectively. Most hypertensive patients had suffered from hypertension for more than 5 years in both groups, namely 70% and 56.7% (Table 1).

Patients with hypertension who consumed soursop leaf tea experienced a noteworthy

**Table 2 Mean Blood Pressure Before and After Soursop Leaf Tea Consumption**

| Variables | Intervention Group | | | | p* | Control Group | | | | p* |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Min | Max | | Mean | SD | Min | Max | |
| Systolic blood pressure | | | | | | | | | | |
| Before | 152.7 | 5.2 | 140 | 160 | <0.001* | 150.1 | 4.3 | 140 | 160 | 0.075 |
| After | 137.3 | 7.8 | 120 | 150 | | 149.1 | 4.5 | 140 | 162 | |
| Diastolic blood pressure | | | | | | | | | | |
| Before | 99.6 | 7.2 | 90 | 120 | <0.001* | 95.2 | 4.3 | 90 | 110 | 0.775 |
| After | 90.1 | 5.2 | 80 | 100 | | 95.0 | 4.1 | 90 | 104 | |

Note: *significant if $p<0.05$, SD= Standard deviation

decrease in both systolic and diastolic blood pressure. Conversely, there was no significant change in mean blood pressure values among patients in the control group. The intervention group exhibited a higher mean blood pressure change score compared to the control group (Table 2). These findings indicate that administering soursop leaf tea to hypertensive patients can effectively lower blood pressure compared to the untreated control group.

The results of the study confirmed a significant difference in systolic blood pressure ($p<0.001$) and diastolic blood pressure ($p<0.001$) before and after the intervention of soursop leaf tea in hypertensive patients. The mean scores of systolic and diastolic blood pressure in the intervention group through the administration of soursop leaf tea decreased significantly compared to the control group ($p<0.001$) (data not shown).

## Discussion

This study revealed that hypertension sufferers who consumed soursop leaf tea experienced a significant decrease in systolic and diastolic blood pressure. Hypertension, a significant risk factor for cardiovascular disease, is the result of a complex interplay between genetic, environmental, and social factors. Contributing factors include obesity, unhealthy diet, excessive sodium intake, inadequate potassium intake, sedentary lifestyle, and alcohol consumption. These factors can exacerbate hypertension or elevate the risk of the condition developing.[18] Soursop leaves are used as an alternative treatment for hypertension because they contain potassium, which can lower blood pressure by relaxing the heart and slowing its beats. Additionally, potassium also helps maintain the balance of body fluid and reduces the endogenous vasoconstriction response, which can reduce blood pressure.[25]

In this study, the administration of soursop leaf tea as much as 1 glass (200 ml) per day to the intervention group resulted in a significant reduction in blood pressure compared to the control group who did not consume soursop leaf tea. Soursop tea is effective in lowering blood pressure. A similar study has shown a decrease in blood pressure before and after soursop leaf consumption from 131.43/92.71 mmHg to 126.86/89.57 mmHg.[26] An RCT study concluded that soursop supplementation was effective in lowering blood pressure levels after 12 weeks of treatment.[27] A decrease in both systolic blood pressure (mean value decreased from 116.94 mmHg to 106.04 mmHg) and diastolic blood pressure (mean value decreased from 76.47 mmHg to 70.07 mmHg) was observed in young adult male hypertensive patients who consumed soursop leaf tea.[22]

The reduction in systolic and diastolic blood pressure before and after consuming soursop tea is due to the beneficial effects of several compounds found in soursop, particularly flavonoids, vitamin C, calcium, and potassium.[28] Potassium ions play a pivotal role in reducing blood pressure through various mechanisms. These mechanisms include attenuating myocardial contractions, promoting sodium excretion, suppressing renin secretion, inducing vasodilation, and inhibiting intrinsic vasoconstriction. Elevated levels of potassium facilitate sodium excretion, which leads to a decrease in blood volume and subsequently lowers blood pressure.[29] Flavonoids act as ACE inhibitors that inhibit the conversion of angiotensin I to angiotensin II, thereby reducing the secretion of antidiuretic hormone (ADH). As a result, a large amount of urine is excreted from the body (diuresis). Secretion of aldosterone from the adrenal cortex is also inhibited, increasing the excretion of NaCl (salt), which ultimately results in a decrease in blood pressure. Flavonoids also modulate the release of nitric oxide as a vasodilator, causing a decrease in blood pressure.[22]

This study has limitations, including not all study subjects consumed soursop tea due time and research funding limitations; the intervention on soursop tea consumption given to study participants was only done once a day in the morning for 14 days, hence, further research is needed to investigate the effect of consuming soursop tea more than once a day; not all study participants were able to commit to the predetermined study timeline, because some lived far from the research location. However, this study has demonstrated that the soursop tea consumption intervention is effective in reducing blood pressure in the study subjects.

To conclude, consumption of chopped soursop leaf tea can significantly reduce systolic and diastolic blood pressure levels after 14 days, indicating that soursop leaf tea is effective in reducing blood pressure in patients with hypertension. Therefore, these finding highlights the need to increase soursop leaf tea consumption among patients with hypertension and this will help reduce dependence on generic drugs, which can affect family income due to the cost of purchasing

hypertension medication and may cause certain side effects.

Further research is needed to explore the optimal frequency of daily soursop leaf tea consumption and the selection of clean and undamaged soursop leaves to achieve normal blood pressure reduction. The results of this study are also input and attention for all stakeholders such as health departments, universities, regents/mayors, and governors to collaborate in socializing and educating the public about the importance of herbal medicine utilization, such as consuming soursop leaf tea to significantly reduce high blood pressure in patients with hypertension and implementing a healthy lifestyle.

## References


1. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. Nat Rev Nephrol. 2020;16(4):223–37.
2. Whelton PK, Carey RM, Aronow WS, Casey Jr DE, Collins KJ, Himmelfarb CD, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. 2018;138(17):e484–94.
3. Hussain MA, Mamun A Al, Reid C, Huxley RR. Prevalence, awareness, treatment and control of hypertension in Indonesian adults aged ≥40 years: findings from the Indonesia Family Life Survey (IFLS). PLoS One. 2016;11(8):e0160922.
4. Husain K, Ansari RA, Ferder L. Alcohol-induced hypertension: Mechanism and prevention. World J Cardiol. 2014;6(5):245–52.
5. Rajkumar E, Romate J. Behavioural risk factors, hypertension knowledge, and hypertension in Rural India. Int J Hypertens. 2020;2020:8108202.
6. 6Dun Q, Xu W, Fu M, Wu N, Moore JB, Yu T, et al. Physical activity, obesity, and hypertension among adults in a rapidly urbanised city. Int J Hypertens. 2021;2021:9982562.
7. Pokharel Y, Karmacharya BM, Neupane D. Hypertension—A silent killer without global bounds. J Am Coll Cardiol. 2022;80(8):818–20.
8. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. Lancet. 2021;398(10304):957–80.
9. World Health Organization. Global action plan for the prevention and control of noncommunicable diseases, 2013–2020. Geneva: WHO; 2013.
10. Health Research and Development Agency of the Ministry of Health of the Republic of Indonesia. Riset kesehatan dasar (Riskesdas) 2018. Jakarta; Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2018.
11. Morgan T. Ace inhibitors, beta-blockers, calcium blockers, and diuretics for the control of systolic hypertension. Am J Hypertens. 2001;14(3):241–7.
12. Feather A, Randall D, Waterhouse M, editors. Kumar and Clark's clinical medicine. 9th Ed. Amsterdam: Elsevier; 2016.
13. Herman LL, Padala SA, Ahmed I, Bashir K. Angiotensin converting enzyme inhibitors (ACEI). In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023.
14. Hicks BM, Filion KB, Yin H, Sakr L, Udell JA, Azoulay L. Angiotensin converting enzyme inhibitors and risk of lung cancer: population based cohort study. BMJ. 2018;363:k4209.
15. Devkota S, Dhungana RR, Pandey AR, Bista B, Panthi S, Thakur KK, et al. Barriers to treatment and control of hypertension among hypertensive participants: a community-based cross-sectional mixed method study in Municipalities of Kathmandu, Nepal. Front Cardiovasc Med. 2016;3:26.
16. Kretchy IA, Owusu-Daaku F, Danquah S. Patterns and determinants of the use of complementary and alternative medicine: a cross-sectional study of hypertensive patients in Ghana. BMC Complement Altern Med. 2014;14:44.
17. Parasuraman S, Thing G, Dhanaraj S. Polyherbal formulation: concept of ayurveda. Pharmacogn Rev. 2014;8(16):73–80.
18. Carey RM, Muntner P, Bosworth HB, Whelton PK. Prevention and control of hypertension: JACC Health Promotion Series. J Am Coll Cardiol. 2018;72(11):1278–93.
19. Cristanto M, Saptiningsih M, Indriarini MY. Hubungan aktivitas fisik dengan pencegahan hipertensi pada usia dewasa muda: literature review. J Sahabat

Keperawatan. 2021;3(01):53–65.
20. Kamyab R, Namdar H, Torbati M, Ghojazadeh M, Araj-Khodaei M, Fazljou SMB. Medicinal plants in the treatment of hypertension: a review. Adv Pharm Bull. 2020;11(4):601–17.
21. Nwokocha CR, Owu DU, Gordon A, Thaxter K, Mccalla G, Ozolua RI, et al. Possible mechanisms of action of the hypotensive effect of *Annona muricata* (soursop) in normotensive Sprague Dawley rats. Pharm Biol. 2012;50(11):1436–41.
22. Pugar HH. Pengaruh teh daun sirsak (Annona muricata Linn) terhadap penurunan tekanan darah normal pada laki-laki dewasa muda [Undergraduate Thesis]. Bandung: Universitas Kristen Maranatha; 2013.
23. Adefegha SA, Oyeleye SI, Oboh G. Distribution of phenolic contents, antidiabetic potentials, antihypertensive properties, and antioxidative effects of soursop ( *Annona muricata L.*) fruit parts in vitro. Biochem Res Int. 2015;2015:347673.
24. Wicaksono GS, Zubaidah E. Pengaruh karagenan dan lama perebusan daun sirsak terhadap mutu dan karakteristik jelly drink daun sirsak. Jurnal Pangan dan Agroindustri. 2015;3(1):281–91.
25. Wulan J. Dahsyatnya khasiat sirsak untuk banyak penyakit yang mematikan. Yogyakarta: Andi Offset; 2012.
26. Dewi WK, Syukrowardi DA. Perbandingan pengaruh antara rebusan air daun salam dan air rebusan daun sirsak terhadap tekanan darah kelompok pre-hipertensi di wilayah kerja Puskesmas Gembong, Serang. CHMK Health J. 2019;3(2):11–9.
27. Alatas H, Sja'bani M, Mustofa M, Mukti AG, Bawazier LA, Irijanto F, et al. The effects of soursop supplementation on blood pressure, serum uric acid, and kidney function in a prehypertensive population in accordance with the 2017 ACC/AHA guideline. J Hum Hypertens. 2020;34(3):223–32.
28. Swastini N. Efektivitas daun sirsak (*Annona muricata Linn*) terhadap penurunan tekanan darah pada hipertensi. J Ilm Kesehat Sandi Husada. 2021;10(2):413–5.
29. Polii R, Engka JNA, Sapulete IM. Hubungan kadar natrium dengan tekanan darah pada remaja di Kecamatan Bolangitang Barat Kabupaten Bolaang Mongondow Utara. J e-Biomedik. 2016;4(2):14862.