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# The impact of tomato juice on hypertension management in the elderly community

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## Abstract
Hypertension is a prevalent cardiovascular condition often experienced by the elderly, affecting 57.6% of this population. One non-pharmacological therapy that can be beneficial for hypertensive patients is nutritional therapy, specifically through dietary management that includes the consumption of tomato juice. The potassium content in tomato juice has the potential to effectively lower both systolic and diastolic blood pressure, making it a promising breakthrough in addressing hypertension. This scientific paper aims to explain gerontic nursing care through the application of tomato juice therapy to reduce blood pressure in the elderly, thereby minimizing the complications associated with hypertension. Using a descriptive approach in the form of a case study, we examined three elderly clients with hypertension. The intervention involved administering tomato juice at a dosage of 150 ml once a day for seven days. The results indicated that while the administration of tomato juice did not lead to a significant decrease in blood pressure—due to the varying lifestyles of each client—it was observed that the consumption of tomato juice could lower hypertension by 10-30 mmHg. The findings suggest that the use of tomato juice may serve as a complementary alternative to pharmacological treatments, considering the numerous benefits of tomatoes, particularly in lowering blood pressure.

**Keywords:** Hypertension; elderly; tomato juice; gerontic nursing; nursing care

## Introduction
Hypertension is a non-communicable disease that poses a significant global health challenge, as it can be a leading cause of death in both developed and developing countries. It is a cardiovascular condition characterized by elevated blood pressure in the circulatory system (Salmah, 2019). In Indonesia, hypertension ranks as the third leading cause of death, accounting for 6.8% of fatalities (Esfandiari, Triwahyuni, Arania, & Aysa, 2021). According to the British Society of Hypertension standards, hypertension is defined by systolic blood pressure measurements of ⩾140 mmHg and diastolic pressure measurements of ⩾90 mmHg, which can be assessed using mercury, digital, or aneroid sphygmomanometers (Harrison, Coffman, & Wilcox, 2021). The World Health Organization (2019) reports that there are approximately 1.13 billion cases of hypertension globally, representing 22% of the population, while in Southeast Asia, the incidence reaches 36% (Pallarés-Carratalá et al., 2023). According to the 2018 Riskesdas survey, the prevalence of hypertension among individuals aged 18 and older is 34.1%, with the highest rates in South Kalimantan at 44.1% and the lowest in Papua at 22.2%, particularly affecting age groups 31-44 years (31.6%), 45-54 years (45.3%), and 55-64 years (55.2%) (Hintari & Fibriana, 2023). Often asymptomatic, hypertension can lead to sudden death, earning it the nickname "the silent killer" (Kalehoff & Oparil, 2020).

The causes of hypertension are often unclear, but several interconnected risk factors have been identified, including genetics, gender, race, lifestyle, and age. The incidence of hypertension and its complications is on the rise, particularly among the elderly, who are already facing various health challenges (Chinnakali et al., 2012). The aging process leads to a decline in cellular function and immunity, increasing the risk of disease. Common health issues among the elderly include malnutrition, balance disorders, and sudden confusion. As the elderly population in Indonesia grows, so does the prevalence of age-related diseases. The cardiovascular system is particularly susceptible to age-related degeneration. There are two primary approaches to managing hypertension: pharmacological and non-pharmacological therapies. Pharmacological treatments include medications such as diuretics, ACE inhibitors, calcium channel blockers, angiotensin receptor blockers, and beta blockers (Trismiyana, Isnainy, & Herizon, 2020). Non-pharmacological therapies involve lifestyle modifications such as reducing salt intake, losing weight, exercising, quitting alcohol and smoking, and increasing the consumption of fruits and vegetables. Certain fruits and vegetables, including bananas, cucumbers, watermelons, strawberries, and tomatoes—specifically in the form of tomato juice—are known to help lower blood pressure (Hapipah et al., 2019). Tomato juice, derived from tomatoes, is rich in potassium (235 mg per 100 g of tomatoes) and lycopene, both of which are effective in reducing

blood pressure. Potassium influences the renin-angiotensin system, leading to vasodilation of blood vessels and a subsequent decrease in blood pressure (Hapipah, Izzah, Ariyanti, & Istianah, 2019).

Tomato juice is emerging as a valuable complementary therapy for managing hypertension, particularly due to its rich content of potassium and lycopene. These components work synergistically to help lower blood pressure by influencing the renin-angiotensin system, promoting vasodilation of blood vessels. As part of a broader approach to hypertension management, which includes lifestyle modifications and dietary adjustments, the incorporation of tomato juice can enhance the overall effectiveness of treatment. With providing a natural and nutritious option, tomato juice not only supports blood pressure reduction but also contributes to the overall health and well-being of individuals dealing with hypertension. This scientific paper aims to explain gerontic nursing care through the application of tomato juice therapy to reduce blood pressure in the elderly, thereby minimizing the complications associated with hypertension.

## Case Description

This case study focuses on the management of three elderly clients with hypertension, applying the findings from previous research on the administration of tomato juice to lower blood pressure. The study was conducted in Gamol 2 Hamlet, Paremono, Magelang Regency. The assessments of the three clients were carried out on May 24, 2024, and are detailed as follows: The first client, Mr. S, is a 64-year-old male with a history of hypertension. He frequently complains of dizziness at the back of his head when his blood pressure rises. Mr. S has been suffering from hypertension for the past 20 years and reports a family history of the condition, as both his biological parents had hypertension. He has never been hospitalized for this issue. Despite his condition, he remains active, working in the rice fields daily and helping with household chores. Upon assessment, his blood pressure was measured at 180/120 mmHg. His palpable pulse was normal, but he appeared agitated, with decreased skin turgor, cold extremities, pale lips, and a capillary refill time (CRT) of over 3 seconds. Although he follows a diet for hypertension, he admits to smoking excessively and finds it difficult to reduce his coffee intake and fried food consumption. He typically seeks treatment only when he feels unwell at the health center. The second client, Mrs. P, is a 62-year-old female who often experiences dizziness, a stiff neck, and palpitations. She has a history of hypertension for the past 10 years but has not routinely taken her medication for the last two years. Her family history includes a biological father with asthma and hypertension, while her mother does not have hereditary diseases such as diabetes, hypertension, or heart disease. During the assessment, her blood pressure was recorded at 170/100 mmHg. She exhibited a normal palpable pulse but appeared weak, with anemic conjunctiva, a pale face, decreased skin turgor, and neck pain. When experiencing symptoms, she typically applies eucalyptus oil to her neck and temples or has her grandchildren perform traditional scraping techniques. Mrs. P prefers salty foods, such as salted fish, and rarely consumes low-salt vegetables. Like Mr. S, she seeks medical attention only when feeling unwell.

The third client, Mrs. E, is a 60-year-old female with hypertension. She has been experiencing headaches for about a week, which worsen during stressful periods. Mrs. E has a history of hypertension for 13 years and reports that her biological father also had the condition. Her blood pressure was assessed at 170/110 mmHg, with a normal palpable pulse. She appeared weak, had decreased skin turgor, cold ankles, pale palms, and a CRT of over 3 seconds. To manage her headaches, she occasionally takes over-the-counter medication. Mrs. E admits to consuming salty foods almost daily, along with fried foods, and rarely eats fruits and vegetables or engages in physical activity. She maintains a regular eating schedule, dining three times a day, and seeks treatment only when feeling unwell. Based on assessments using the WOD method (interview, observation, and documentation), all three clients were diagnosed with ineffective peripheral perfusion risk, characterized by hypertension, normal palpable pulses, cold extremities, pale skin, decreased skin turgor, and CRTs exceeding 3 seconds. To address hypertension, interventions were implemented for the risk of ineffective peripheral perfusion, following the SDKI guidelines. These included checking peripheral circulation, identifying risk factors for circulatory disorders, preventing infections, recommending smoking cessation, encouraging regular exercise, advising on dietary changes to improve circulation, informing clients about emergency signs and symptoms, and applying complementary measures such as tomato juice for blood pressure reduction. The intervention involved administering tomato juice based on previously analyzed journal articles. From May 24 to May 30, 2024, each client received seven interventions, with a dose of 150 grams of tomatoes (without added sugar or water) per session. The first intervention for each client included measuring blood pressure 10 minutes before consuming the tomato juice. The author visited each client's home to conduct the intervention individually.

## Discussion

The administration of tomato juice as a remedy for hypertension is supported by a study on 16 clients (Hapipah, Izzah, Ariyanti, & Istianah, 2019). In the study, tomato juice was administered for 7 days, with blood pressure monitored 10 minutes before and 30 minutes after consumption. The dosage was 150 grams of tomato juice, without added sugar or water. According to DASH (Dietary Approaches to Stop Hypertension), adding sugar to tomatoes is not recommended, as it can destroy the B vitamins in tomatoes and lead to an excessive amount of sugar, which may interfere with nutrient absorption. In this study, three clients participated, following the same procedure as in the previous research.

After 7 days of consuming tomato juice, all three clients showed a significant decrease in blood pressure: Mr. S experienced a decrease of 30 mmHg, while Mrs. P and Mrs. E had reductions of 20 mmHg each. The variations in blood pressure changes among the clients may be attributed to their lifestyles, including smoking, salt intake, and coffee consumption, which can all contribute to increased blood pressure.

A study notes that toxic chemicals such as nicotine and carbon monoxide from cigarettes can damage the endothelial lining of blood vessels (Gao et al., 2023). Smoking increases heart rate and oxygen demand in the heart muscles, further elevating the risk of arterial damage, especially in those with high blood pressure (Talukder et al., 2011). Sodium intake is also linked to high blood pressure, as excessive salt can constrict arteries, forcing the heart to work harder to pump blood, thus raising blood pressure. Conversely, reducing sodium intake can lower blood volume and blood pressure in some individuals (Aronow, 2017). Additionally, a study showed that administering tomato juice for one week resulted in a 10-20 mmHg decrease in blood pressure (Trismiyana, Isnainy, & Herizon, 2020). The theoretical explanation for these results is that the potassium in tomato juice lowers blood pressure by inhibiting renin release, leading to increased sodium and water excretion (Palmer & Clegg, 2020). Renin, which circulates in the blood, catalyzes the conversion of angiotensin into angiotensin I, which is then converted to angiotensin II with the help of Angiotensin Converting Enzyme (ACE). Angiotensin II is a potent vasoconstrictor and stimulates aldosterone production, which raises blood pressure through sodium retention. Potassium reduces sodium and water retention, decreasing plasma volume, cardiac output, peripheral pressure, and ultimately blood pressure (Lestari & Rahayuningsih, 2017). The 7-day tomato juice regimen did not cause any side effects, as evidenced by the decrease in blood pressure among the three clients.

Similarly, this study supports the use of tomato juice as a practical, easy, and cost-effective treatment for hypertension that has no side effects. However, the previous research had limitations, such as the difficulty in controlling clients' activities outside the study, making it challenging for researchers to monitor factors like smoking, coffee consumption, and other habits that could influence blood pressure. Addressing hypertension requires good collaboration between patients and healthcare providers. Nurses or students have promoted dietary therapy for hypertension, including drinking tomato juice. The expected self-care behavior is compliance with blood pressure control, ideally by consuming tomato juice before lunch for maximum results. It is recommended that students or clients regularly engage in hypertension therapy for the elderly, whether or not they have hypertension, to help control blood pressure. Elderly patients who have received counseling should be encouraged to drink tomato juice independently before lunch. From the implementation with three clients over one week, there was a noticeable change in blood pressure after consuming tomato juice. Supporting factors for this activity include its practicality, low cost, lack of harmful side effects, and the ease of obtaining and processing the ingredients. However, the main limitation was the inability to control client activities outside the study, which may have affected the results. Tomato juice therapy may be more effective for clients with grade 1 hypertension, as it can help normalize or improve their blood pressure.

## Conclusion

Based on the results and discussion of this case study, it can be concluded that all three elderly clients experienced the same health issue: hypertension. After 7 days of consuming tomato juice, there was a significant decrease in their blood pressure, with the juice proving more effective for clients with grade 1 hypertension. The analysis reveals that tomatoes contain health-beneficial substances and are a much cheaper and more economical alternative to pharmacological treatments. Additionally, tomatoes are easily accessible in the community, making them a healthy and affordable option for lowering blood pressure. In managing hypertension among elderly clients, nurses play a crucial role in implementing and promoting complementary therapies such as tomato juice consumption. They are responsible for assessing patients' health status, educating them about the benefits of dietary modifications, and encouraging adherence to lifestyle changes that can effectively lower blood pressure. By providing individualized care plans that incorporate affordable and accessible options like tomato juice, nurses can empower clients to take an active role in their health management. Additionally, nurses should monitor patients' progress, evaluate the effectiveness of interventions, and adjust care plans as necessary. They also serve as advocates for their clients, helping to bridge the gap between traditional pharmacological treatments and natural remedies. Through education, support, and ongoing assessment, nurses can significantly influence the health outcomes of elderly patients with hypertension, fostering a holistic approach to their care.

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