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Case Study

Blood Pressure Changes Following Beet Juice Administration in a Patient with Hypertension: A Case Report

Salman Jauhari Hartono[1], Henik Tri Rahayu[2]

[1,2]Universitas Muhammadiyah Malang, Malang, Indonesia

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Corresponding author

Salman Jauhari Hartono*
Universitas Muhammadiyah Malang
Jl. Bendungan Sutami No.188, Sumbersari, Lowokwaru, Malang, East Java
Phone : -
Email: salmanjauharihartono@gmail.com

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Abstract

Background: Hypertension is a chronic disease marked by elevated blood pressure, often accompanied by complaints such as dizziness and a heavy feeling in the neck. Beet juice contains nitrates that can be converted into nitric oxide (NO), which promotes vasodilation and may help lower blood pressure.
Objective: This case report describes changes in blood pressure following the administration of beet juice in a patient with hypertension.
Methods: A case-report method with a nursing-care approach was used, involving one patient with hypertension. The intervention consisted of 70 mL of beet juice, made from one beet weighing approximately 250 grams, given once daily for three consecutive days, while antihypertensive medication and routine nursing care were continued throughout. Blood pressure and pulse were assessed at only two time points—baseline and the third-day evaluation, three hours after the final administration—without daily monitoring in between; complaints were monitored throughout, and no adverse events or intolerance were observed during the intervention.
Results: Before the intervention, blood pressure was 158/92 mmHg with a pulse of 79 beats per minute, accompanied by dizziness and a heavy feeling in the neck. After three consecutive days of beet-juice administration, evaluation on the third day, three hours after consumption, showed a blood pressure of 143/86 mmHg with a pulse of 83 beats per minute, and the complaints were no longer present.
Conclusion: Beet-juice administration for three consecutive days occurred alongside a decrease in blood pressure from 158/92 mmHg to 143/86 mmHg and resolution of dizziness and a heavy feeling in the neck, alongside continued antihypertensive therapy. Given the single-case, non-comparative design, this observation should be interpreted as illustrative rather than evidence of a treatment effect; beet juice may be feasible as an adjunctive component of nursing care, but controlled studies are needed before conclusions about clinical effectiveness can be drawn.

Keywords: Beet juice; blood pressure; case report; complementary intervention; hypertension.

INTRODUCTION

Hypertension is a major noncommunicable disease and an important cardiovascular risk factor. It may remain asymptomatic for long periods, which can delay diagnosis and treatment. Persistent uncontrolled blood pressure increases the risk of cardiovascular, cerebrovascular, and renal complications (1). In Indonesia, hypertension remains common among adults and requires sustained

pharmacological treatment, lifestyle modification, and long-term monitoring (2).

Management of hypertension basically includes pharmacological and non-pharmacological therapy. Non-pharmacological therapy can be used as a complementary therapy to help control blood pressure through lifestyle changes and the use of functional foods. One food ingredient with potential as a complementary therapy is beetroot (Beta vulgaris L.) (3). Beetroot has a high content of inorganic nitrate. After consumption, nitrate is reduced to nitrite by commensal bacteria in the oral cavity and subsequently converted into nitric oxide (NO) in the circulation. Increased NO availability can enhance vasodilation of blood vessels, reduce peripheral vascular resistance, improve endothelial function, and ultimately help lower blood pressure (4).

Empirical evidence regarding the effectiveness of beet juice on blood pressure has also been demonstrated in several studies. Grönroos et al. (5), through a systematic review and meta-analysis of 11 randomized controlled trials (RCTs) in hypertensive patients, found that consumption of nitrate-rich beet juice produced a significant reduction in systolic blood pressure compared with the control group, with a mean difference of 5.31 mmHg. Most studies used nitrate doses of 200–800 mg per day, with 400 mg being one of the most frequently used doses. The study also showed that beet juice was well tolerated and had potential as a complementary therapy in hypertension management.

A study by Benjamim et al. (6), through a systematic review and meta-analysis of 218 hypertensive patients, also showed that consumption of nitrate-rich beet juice produced a significant reduction in systolic blood pressure compared with the control group. This effect was related to increased nitric oxide bioavailability via the nitrate–nitrite–NO pathway, which plays a role in vasodilation, improved endothelial function, and reduced peripheral vascular resistance. The results showed that changes in blood pressure could be observed starting from the third day of intervention, so that administering beet juice for three days may be a relevant approach for case-based nursing intervention.

Available evidence suggests that nitrate-rich beetroot products may have a modest blood-pressure-lowering effect in some adults with hypertension, although intervention dose, nitrate content, treatment duration, and background antihypertensive therapy vary across studies (5,7). These data provide a rationale for examining beet juice as an adjunctive dietary intervention, but they do not justify substituting it for prescribed antihypertensive treatment.

Despite the growing body of randomized-trial and meta-analytic evidence on nitrate-rich beet juice and blood pressure, few reports describe how such an intervention is actually delivered and monitored within routine nursing care for an individual hypertensive patient. Documenting a short, nursing-supervised beet-juice intervention at the level of a single patient may offer practical insight that complements aggregate trial data—illustrating how nurses might structure, monitor, and evaluate this complementary approach alongside ongoing pharmacological therapy in everyday clinical practice. Therefore, this case report aims to describe the blood-pressure and clinical response of one patient with hypertension following a nursing-supervised beet-juice intervention delivered alongside continued antihypertensive care (8).

METHODS

Study Design

This case report used a case-report method with a nursing-care approach involving one patient with hypertension. Evaluation was conducted descriptively by comparing blood pressure before and after the beet-juice intervention to describe the patient's clinical response during the intervention period. The case-report design was chosen because this study focused on systematically reporting the clinical condition, intervention, response, and outcome in one patient with hypertension, consistent with the CARE (CAse REport) reporting framework for nursing case reports. This approach allowed the changes in blood pressure and clinical response of the patient after beet-juice administration to be described individually within the context of nursing care (9).

Sample

The sample in this case report consisted of one adult patient clinically diagnosed with hypertension who was receiving routine care at the reporting institution. The patient was selected using a purposive, single-case approach appropriate for nursing case-report

methodology. Inclusion criteria were: diagnosed with hypertension (systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg), willing to participate and able to provide informed consent, had no known allergy or contraindication to beetroot consumption, and continued routine pharmacological antihypertensive therapy according to the medical program throughout the intervention period. The patient presented with complaints of dizziness and a heavy feeling in the neck, with a baseline blood pressure of 158/92 mmHg and a pulse of 79 beats per minute. The patient's antihypertensive regimen consisted of amlodipine 10 mg, taken regularly with good adherence throughout the intervention period. The patient had no other relevant comorbidities and followed no special diet or dietary restriction beyond the beet-juice intervention during the study period.

Instruments

Blood pressure and pulse rate were measured using a calibrated digital sphygmomanometer following a standardized measurement procedure**:** the patient was seated with the measured arm supported at heart level, after a 10-minute rest period, and a single reading was taken and recorded at each assessment. A structured observation checklist was used to monitor the patient's general condition and clinical response throughout the intervention period, and a semi-structured interview guide was used to explore the patient's health history and subjective complaints (dizziness and a heavy feeling in the neck). The intervention instrument consisted of fresh beet juice (Beta vulgaris), prepared from one beet weighing approximately 250 grams and processed into 70 mL of juice for a single administration, given once daily for three consecutive days, based on its inorganic nitrate content, which can be converted into nitric oxide (NO) and contributes to blood-vessel vasodilation and blood-pressure reduction (4,6). The nitrate content of the 70 mL beet-juice preparation used in this case was not directly measured; beet weight and juice volume are reported here as preparation parameters and should not be equated with a known or standardized nitrate dose. This case report was prepared with reference to the CARE (CAse REport) guidelines.

Data Collection

Data were collected through observation, interviews, and blood-pressure measurement. Observation was carried out to monitor the patient's general condition and response during the intervention. Interviews were conducted to obtain information regarding the patient's health history, complaints, and conditions related to hypertension. Blood pressure was measured before the intervention and at the final evaluation to describe changes in blood pressure during the intervention period. The initial assessment showed the patient's blood pressure was 158/92 mmHg with a pulse of 79 beats per minute, accompanied by complaints of dizziness and a heavy feeling in the neck (10).

The final evaluation was conducted on the third day, three hours after consuming the beet juice, by comparing blood-pressure measurements before the intervention and at the end of the intervention period, and by observing changes in the patient's complaints (11).

Data Analysis

Data were analyzed descriptively by comparing systolic and diastolic blood pressure at baseline with the third-day evaluation. Because this report involved a single patient, no inferential statistical analysis was performed. The observed blood-pressure and symptom changes were interpreted as temporal changes during a period in which beet juice was administered alongside continued antihypertensive therapy, rather than as evidence of a causal treatment effect.

Ethical Considerations

The conduct of this case report considered research and nursing-care ethical aspects. Before the study was conducted, informed consent was provided to the respondent after receiving an explanation of the purpose, benefits, procedure, and evaluation process of the intervention. The patient's privacy and confidentiality were protected by not including the patient's complete identity in the report and by using initials or codes for data presentation.

RESULTS

Table 1. Blood Pressure and Pulse Measurements Before and After Beet-Juice Intervention

Time of Measurement	Systolic (mmHg)	Diastolic (mmHg)	Pulse (beats/min)	Complaints
Before intervention	158	92	79	Dizziness and a heavy feeling in the neck
Day 3 evaluation, 3 hours after consumption	143	86	83	Dizziness and a heavy feeling in the neck no longer felt

This case report describes one patient diagnosed with hypertension who received beet juice (Beta vulgaris) as a complementary therapy for three consecutive days. The beet juice was made from one beet weighing approximately 250 grams, processed into 70 mL of juice for a single administration. The intervention was given once daily for three consecutive days. Monitoring was carried out through observation of the patient's condition, interviews regarding complaints, and measurement of blood pressure and pulse before and after the intervention. The final evaluation was conducted on the third day, three hours after consuming the beet juice (12). It should be noted that blood pressure and pulse were assessed at only these two time points—baseline and the third-day evaluation—without daily monitoring in between; this is a major limitation that restricts characterization of the trajectory of change across the three-day intervention period.

Based on the initial assessment, the patient had a blood pressure of 158/92 mmHg with a pulse rate of 79 beats per minute. The patient also complained of dizziness and a heavy feeling in the neck. Based on this condition, the patient was given beet juice as a complementary therapy. The beet juice was made from one beet weighing approximately 250 grams and produced 70 mL of juice per administration. The intervention was given once daily for three consecutive days while pharmacological therapy was continued according to the medical program. Monitoring was carried out during the intervention period to determine changes in blood pressure and the patient's response (13).

On the third day, an evaluation was performed three hours after consuming the beet juice. The measurement results showed the patient's blood pressure decreased from 158/92 mmHg to 143/86 mmHg. Thus, there was a decrease in systolic blood pressure of 15 mmHg and diastolic blood pressure of 6 mmHg. In addition to the change in blood pressure, there was a change in the patient's subjective complaints. At the initial assessment, the patient complained of dizziness and a heavy feeling in the neck. After three consecutive days of beet-juice intervention, these complaints were no longer felt (14).

Overall, administration of beet juice—made from one beet weighing approximately 250 grams and given at 70 mL per day for three consecutive days—was followed by a decrease in systolic blood pressure of 15 mmHg, from 158 mmHg to 143 mmHg, and diastolic blood pressure of 6 mmHg, from 92 mmHg to 86 mmHg. The complaints of dizziness and a heavy feeling in the neck that were present before the intervention were no longer felt after the intervention (15).

DISCUSSION

In this case, administration of 70 mL of beet juice once daily for three consecutive days occurred alongside a reduction in blood pressure from 158/92 mmHg at baseline to 143/86 mmHg at the third-day evaluation, performed three hours after the final administration. Dizziness and a heavy feeling in the neck were no longer reported at the final assessment. These observations describe the patient's clinical course during the intervention period but do not establish that beet juice caused the changes.

A biologically plausible explanation for a blood-pressure response to nitrate-rich beetroot involves the nitrate–nitrite–nitric oxide pathway, which can increase nitric oxide

bioavailability and promote vasodilation (4). However, nitrate content was not measured in the preparation used in this case, so this mechanism cannot be confirmed for the individual patient.

The findings of this case are consistent with the systematic review and meta-analysis conducted by Grönroos et al. (5) on 11 randomized controlled trials (RCTs) in hypertensive patients. The pooled analysis showed that consumption of nitrate-rich beet juice produced a significant reduction in systolic blood pressure compared with the control group, with a mean difference of 5.31 mmHg. This reduction exceeded the minimal important difference of 5 mmHg, indicating clinical relevance for hypertension control. The study also showed that most studies used nitrate doses of around 200–800 mg per day, with 400 mg being one of the most frequently used doses.

The findings of this case are also supported by Benjamim et al. (6) through a systematic review and meta-analysis on nitrate-rich beet-juice consumption in hypertensive patients. That study was used as one basis for evidence-based nursing that beet-juice administration can affect blood pressure through increased nitric-oxide production. In addition, Sagar et al. (7) used beet juice rich in approximately 400 mg of nitrate per day and showed that regular consumption has the potential to improve endothelial function, increase vasodilation, and help lower blood pressure in hypertensive patients.

Dosage and duration of administration are also factors that need to be considered in explaining the results of this case. In the literature used as the basis for this case report, various studies used 70–250 mL of beet juice per day with a nitrate content of around 300–500 mg, while the duration of intervention in several studies ranged from three to seven days. Regular consumption of beet juice allows for an increase and maintenance of nitrate, nitrite, and nitric-oxide bioavailability, which can support a sustained vasodilation process. In this case, beet juice was given at 70 mL once daily for three consecutive days, followed by evaluation on the third day, three hours after consumption (16). It should be noted that the nitrate content of the beet juice actually administered to the patient was not directly quantified in this case report; the 300–500 mg range cited above reflects values reported in the literature and is presented for context rather than as a measured value for this specific juice preparation.

The timing of the final measurement—three hours after beet-juice consumption—coincides with a period in which nitrate-derived nitric oxide effects may occur according to prior studies (17). Nevertheless, with only two blood-pressure assessments and no untreated or comparator period, normal short-term blood-pressure variability, regression to the mean, rest, medication effects, and other contextual factors remain plausible alternative explanations.

In addition to the change in blood pressure, the intervention was also associated with improvement in the patient's subjective complaints. Before the intervention, the patient experienced dizziness and a heavy feeling in the neck, whereas after three days of beet-juice administration these complaints were no longer felt. This improvement in complaints may occur alongside the change in blood pressure, but other factors such as rest, activity, psychological condition, adherence to pharmacological therapy, diet, and the patient's clinical condition may also affect complaints and blood pressure. Therefore, the resolution of dizziness and a heavy feeling in the neck after three days of beet-juice administration indicates an improvement in the patient's subjective condition in line with the decrease in blood pressure, suggesting that the beet-juice intervention has the potential to benefit the patient's clinical condition during the intervention period (18).

The administration of beet juice to the patient in this case was carried out as a complementary therapy, not as a substitute for pharmacological therapy. This is important because hypertensive patients still need to continue antihypertensive therapy according to the medical program. Studies also emphasize the importance of educating patients to continue adhering to antihypertensive therapy, adopt a healthy lifestyle, and monitor blood pressure during beet-juice administration. Monitoring becomes increasingly important because nitrate in beet juice can increase nitric-oxide production and provide a vasodilatory effect that may potentiate the blood-pressure-lowering effect of antihypertensive medication (19).

As a single-case, non-comparative observation, several alternative explanations besides the

beet-juice intervention itself cannot be ruled out. Regression to the mean is possible, since the patient was assessed shortly after an elevated baseline reading and blood pressure naturally fluctuates over short periods due to factors such as rest, activity, stress, time of day, and measurement conditions. The continued antihypertensive medication, dietary changes, improved adherence during the observation period, and the patient's psychological response to receiving additional nursing attention (a placebo-like or Hawthorne effect) may also have contributed to the observed change. Because the nitrate content of the juice was not measured and blood pressure was assessed at only two time points, the dose–response relationship and the specific contribution of beet juice relative to these alternative factors cannot be established from this case alone. No adverse events, gastrointestinal intolerance, or symptomatic hypotension were observed during the intervention; however, because nitrate-rich beet juice may potentiate the effect of antihypertensive medication, clinicians and patients should remain attentive to signs of excessive blood-pressure lowering when such complementary interventions are introduced alongside pharmacological therapy. This distinction underscores that beet-juice administration, as reported here, functioned as a component of complementary nursing support rather than as a substitute for, or independently verified treatment of, hypertension.

From a nursing perspective, current evidence increasingly supports the effectiveness of structured, nurse-led interventions in hypertension management. Systematic reviews and meta-analyses have shown that nurse-led interventions in general practice and community settings can significantly reduce systolic and diastolic blood pressure and improve cardiovascular risk factors compared with usual care (20,21). Complementary to pharmacological approaches, dietary nitrate interventions such as beet juice demonstrate a dose-dependent relationship with blood pressure reduction, with meta-analytic evidence indicating that both nitrate dose and duration of administration influence the magnitude of the blood-pressure-lowering effect (22). This supports integrating structured dietary counseling, such as guidance on nitrate-rich beet juice, into nurse-led lifestyle interventions for hypertensive patients (23). Models combining continuing nursing care, health education, and structured monitoring—such as advanced-practice-nurse-led follow-up and chronic disease management programs—have similarly been shown to improve blood pressure control, medication adherence, and patient satisfaction (24,25). These findings reinforce the relevance of nurses' active role, not only in administering complementary interventions such as beet juice but also in providing continuous monitoring, patient education, and coordination with pharmacological therapy to optimize blood pressure outcomes.

Study Limitations

This case report has several limitations. First, the reported case involved only one patient, so the results cannot be generalized to all hypertensive patients. Second, there was no control group, so the observed change in blood pressure cannot be fully attributed to the beet-juice administration alone. Third, the intervention was carried out for only three days, whereas several previous studies used a longer intervention duration. Grönroos et al. (5) showed that studies on beet juice have highly varied durations, with most studies using daily intervention for several weeks. Fourth, blood pressure was assessed using conventional sphygmomanometry at a single time point on the third day, without ambulatory or repeated home monitoring, which may limit the precision of the observed effect. Fifth, the nitrate content of the beet juice administered was not directly measured; the case relied on the beet's weight and juice volume as a practical proxy, so the actual nitrate dose received by the patient remains an estimate rather than a confirmed value. Therefore, the results of this case provide an illustration that administration of beet juice for three days may offer clinical benefit in helping to lower blood pressure in hypertensive patients, although studies with larger sample sizes, control groups, and longer intervention durations are needed to strengthen these findings.

CONCLUSION

Based on the results of this case report involving one patient diagnosed with hypertension who received 70 mL of beet juice per day, made from one beet weighing approximately 250 grams, for three consecutive days, it can be concluded that beet-juice administration was associated with a change in the patient's blood pressure. The

patient's blood pressure before the intervention was 158/92 mmHg with a pulse of 79 beats per minute, and at the evaluation on the third day, three hours after consuming the beet juice, it decreased to 143/86 mmHg with a pulse of 83 beats per minute, representing a decrease in systolic blood pressure of 15 mmHg and diastolic blood pressure of 6 mmHg.

In addition, the complaints of dizziness and a heavy feeling in the neck present before the intervention were no longer felt by the patient after three consecutive days of intervention. These results describe a change in blood pressure and symptoms that occurred while beet juice was administered alongside continued pharmacological therapy according to the medical program. Given the single-case, non-comparative design of this report, this observation demonstrates feasibility rather than proven effectiveness; it should not be interpreted as evidence that beet juice caused the change in blood pressure, and beet-juice administration should be regarded as a potential adjunctive component of nursing care rather than a substitute for, or independently verified treatment of, hypertension.

For nursing practice, the case illustrates the importance of monitoring blood pressure, medication adherence, dietary practices, and tolerance when patients choose to use nitrate-rich foods as adjuncts to routine care. Beet juice should not be presented as a substitute for prescribed antihypertensive therapy. Controlled studies with standardized nitrate dosing and repeated blood-pressure measurements are required before effectiveness can be inferred.

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Author Contributions

Salman Jauhari Hartono (SJH) conceived and designed the case report, collected and analyzed the patient data, and drafted the manuscript. Henik Tri Rahayu (HTR) supervised the case-report process, contributed to the interpretation of findings, and critically revised the manuscript for important intellectual content. Both authors read and approved the final version of the manuscript for submission.

Conflict of Interest Disclosure

The authors declare that there is no conflict of interest in this study.

Data Availability Statement

The data supporting the findings of this case report are available from the corresponding author upon reasonable request, subject to protection of patient confidentiality and privacy.

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