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BEET THE PRESSURE: FRESH EVIDENCE ON BEETROOT JUICE REDUCING BLOOD PRESSURE IN YOUNG ADULTS

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ABSTRACT

Background: Hypertension is a growing public health concern, even among young adults. Dietary nitrate supplementation, particularly from natural sources like beetroot juice, has shown potential in maintaining optimal blood pressure (BP) levels. This study assessed the effectiveness of beetroot juice in reducing systolic and diastolic blood pressure among normotensive nursing students. **Methods:** A quasi-experimental one-group pre-test post-test design was employed among 50 normotensive nursing students aged 18–22 years from a selected nursing college in Tumkur. Participants consumed 250 ml of freshly prepared beetroot juice (150 g beetroot blended with 100 ml water) every morning on an empty stomach for 28 consecutive days. Blood pressure was measured before and after the intervention. Data were analyzed using descriptive statistics and paired t-tests. **Results:** The mean systolic blood pressure (SBP) reduced from 124.2 ± 6.8 mmHg (pre-test) to 117.6 ± 5.9 mmHg (post-test), and the mean diastolic blood pressure (DBP) decreased from 82.4 ± 5.4 mmHg to 76.8 ± 4.6 mmHg. The differences were statistically significant ($p < 0.001$). **Conclusion:** Daily consumption of beetroot juice significantly lowers systolic and diastolic blood pressure in normotensive young adults. This natural, cost-effective intervention holds promise as a non-pharmacological strategy to maintain cardiovascular health and prevent early onset of hypertension.

INTRODUCTION

Hypertension remains a major contributor to global cardiovascular morbidity and mortality, affecting over 1.3 billion individuals worldwide (Kario et al., 2024). In India, changing dietary habits, sedentary lifestyles, and academic stress contribute to rising BP among youth. Between 2015–2016 and 2019–2021, the prevalence of prehypertension among Indian men increased from 38.9% to 44.5% and among women from 21.1% to 26.9% (Khan et al., 2025; Mohammad et al.,2024). Although often considered a middle-aged condition, hypertension is now emerging in younger populations. Pharmacological management is effective but costly and carries potential side effects (Whelton et al., 2018). Hence, non-pharmacological interventions such as diet modification are gaining attention. Beetroot (Beta vulgaris) is rich in dietary nitrates, which are converted to nitric oxide—a vasodilator that relaxes blood vessels and reduces BP (He et al., 2021; Zupet et al.,2021). While numerous studies show beetroot juice effectively lowers BP in hypertensive adults (Mostafa Norouzzadeh et al., 2024), little research exists among normotensive young adults. This study bridges that gap by evaluating the impact of daily beetroot juice consumption on BP among nursing students in Tumkur, India.

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METHODOLOGY

A quasi-experimental one-group pre-test post-test design was adopted at Sri Siddhartha College of Nursing, Tumkur, Karnataka.

Sample and Criteria: Fifty normotensive nursing students aged 18–22 years were selected using purposive sampling. Inclusion criteria were willingness to participate and absence of hypertension or allergies to beetroot.

Intervention: Each participant consumed 250 ml of freshly prepared beetroot juice daily for 28 consecutive days on an

empty stomach (prepared from 150 g beetroot blended with 100 ml water). Intake was monitored for compliance.

Data Collection: Blood pressure was recorded before and after the 28-day intervention using a standardized sphygmomanometer and stethoscope. Demographic variables such as age, education level, and dietary pattern were documented.

Ethical Clearance: Ethical approval for the study was obtained from the Institutional Ethics Committee, Sri Siddhartha Medical College, Tumkur (Approval No.: SSMC/MED/IEC-004/Feb-2025, Date: 15/02/2025). All participants provided informed consent before participation.

Statistical Analysis: Data were analyzed using SPSS (version 25.0). Descriptive statistics (frequency, percentage, mean, and SD) summarized participant characteristics. A paired t-test assessed the significance of differences between pre- and post-test BP readings. Statistical significance was set at $p < 0.05$.

RESULTS

Section A: Socio-Demographic Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18	12	24
	19	14	28
	20	10	20
	21	10	20
	22	4	8
Education	B.Sc. Nursing (1st year)	5	10
	GNM (1st year)	26	52
	B.Sc. Nursing (2nd year)	3	6
	GNM (2nd year)	2	4
	B.Sc. Nursing (3rd year)	4	8
	GNM (3rd year)	3	6
	B.Sc. Nursing (4th year)	7	14
Dietary pattern	Mixed	46	92
	Vegetarian	4	8

Section B: Comparison of Pre-Test and Post-Test Blood Pressure

Parameter	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	*t* Value	*p* Value	Significance
Systolic BP (mmHg)	124.2 ± 6.8	117.6 ± 5.9	6.6	8.54	<0.001	Significant
Diastolic BP (mmHg)	82.4 ± 5.4	76.8 ± 4.6	5.6	7.12	<0.001	Significant

Interpretation: Paired *t*-test results indicate a statistically significant reduction in both systolic and diastolic BP after the 28-day intervention, confirming the effectiveness of beetroot juice.

DISCUSSION

This study confirms that beetroot juice consumption significantly lowers both systolic and diastolic BP among normotensive young adults. The findings align with those of Kapil et al. (2021), who demonstrated similar BP reductions following nitrate-rich beetroot supplementation. Beetroot's mechanism involves the bioconversion of nitrate (NO3-) to nitric oxide (NO), promoting vasodilation, reduced peripheral resistance, and improved endothelial function (He et al., 2021; Lidder & Webb, 2023 ; Zhao et al.,2022). The observed reduction in mean SBP (6.6 mmHg) and DBP (5.6 mmHg) is consistent with previous trials (Hobbs et al., 2019; Ashor et al., 2020). The study underscores early preventive measures in students, supporting preventive cardiology principles (Patel et al., 2023). Limitations include a small sample and lack of control group. Future randomized trials are recommended.

CONCLUSION

Daily consumption of 250 ml beetroot juice for 28 days significantly reduced systolic and diastolic BP among normotensive nursing students. Beetroot juice is a safe, inexpensive, and accessible natural intervention for maintaining cardiovascular health. Integration of such evidence-based dietary strategies into lifestyle education programs for students and communities could promote long-term heart health.

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Conflict of Interest

The authors declare no conflicts of interest.

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