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The Effect of Red Guava (Psidium guajava) Juice on Blood Pressure Among Workers With Prehypertension at CV Koranda Food: A Quasi-Experimental Study

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Abstract

Background: Prehypertension frequently progresses to hypertension, and dietary approaches are attractive first-line options for working adults. Red guava is rich in potassium, vitamin C, lycopene, and flavonoids. Objective: To evaluate the effect of red guava juice on blood pressure in workers with prehypertension. Methods: A quasi-experimental one-group pretest-posttest study enrolled 20 factory workers who drank 350 mL of unsweetened red guava juice daily for seven days. Blood pressure was measured at baseline and on days 2, 4, and 7. Results: Mean systolic pressure fell from 127.40 to 121.60 mmHg (mean reduction 5.80 mmHg; 95% CI 4.48 to 7.12; $p < 0.001$). Diastolic pressure did not change significantly (81.00 to 80.00 mmHg; $p = 0.102$). Conclusion: Short-term red guava juice was associated with a significant systolic reduction, but controlled trials are needed.

Keywords: Red Guava, Psidium Guajava, Prehypertension, Blood Pressure, Dietary Intervention, Occupational Health

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INTRODUCTION

Blood pressure is the hydrodynamic force exerted on the arterial wall as the myocardium ejects blood into the vascular system, and it is a central determinant of cardiovascular health (Rahayu & Budiasti, 2022). It is expressed in millimeters of mercury (mmHg) as a systolic value, reflecting the peak pressure during ventricular contraction, and a diastolic value, reflecting the lowest pressure during ventricular relaxation. Hypertension is conventionally diagnosed when repeated measurements reach 140/90 mmHg or higher (Wulandari & Cusmarih, 2024; Ismafiaty et al., 2024). Prehypertension is the preceding stage, in which systolic pressure lies between 120 and 139 mmHg or diastolic pressure between 80 and 89 mmHg (Jasmine et al., 2022). Systolic elevation contributes directly to a higher vascular load, although the magnitude of the response varies with age, body position, and psychological stress (Ismafiaty et al., 2024). Hypertension remains one of the largest preventable contributors to the global burden of disease. The World Health Organization estimates that roughly one in five adults worldwide has elevated blood pressure, and that complications of the condition cause millions of deaths each year (World Health Organization, 2025). The burden is growing fastest in low- and middle-income countries, including Southeast Asia, where reported prevalence approaches 36% (Hamdani et al., 2024; Sulistiany, 2023). Hypertension is often described as a “silent killer” because it can damage the vasculature for years without specific symptoms, and target-organ injury such as retinopathy, nephropathy, or myocardial ischemia is frequently recognized only after complications appear (Octavianie et al., 2022; Sulistiany, 2023).

In Indonesia, hypertension ranks among the leading causes of mortality, contributing 6.7% of national deaths across all age groups (Sulistiany, 2023). The 2018 national basic health survey (Riskesdas) recorded a prevalence of 34.1% among adults aged 18 years and above, with higher rates among women (36.9%) than men (31.3%) (Jasmine et al., 2022). Prevalence

rises steeply with age, from 20.1% in people aged 25 to 34 years to 31.6% at 35 to 44 years and 45.3% at 45 to 54 years (Mayang et al., 2025). North Sumatra Province has also reported a large hypertensive population, with provincial and national surveys placing the proportion of affected residents at approximately one third or more (Mayang et al., 2025). Urban settings tend to show a somewhat higher prevalence than rural ones, which has been linked to stress, processed high-sodium diets, and low physical activity among urban workers (Mayang et al., 2025). The clinical stakes are considerable. Uncontrolled arterial pressure has been associated with a markedly increased risk of stroke, congestive heart failure, and myocardial infarction, and a family history of hypertension roughly doubles individual susceptibility (Zubiyo et al., 2025). Lifestyle factors including low physical activity, smoking, alcohol intake, excessive sodium consumption, and low intake of dietary fiber from fruits and vegetables accelerate vascular pathology (Sulistiany, 2023; Octavianie et al., 2022). Because hypertension reduces quality of life and work productivity, workplaces are an important setting for early detection and prevention (Zubiyo et al., 2025). Prehypertension is a particularly relevant target. It represents a phase in which vascular changes have begun but pharmacotherapy is usually not yet indicated, so lifestyle and nutritional strategies can be applied with minimal risk (Rahayu & Budiasti, 2022).

Management of established hypertension rests on two pillars: pharmacological treatment and non-pharmacological measures (Carey et al., 2021; Hamdani et al., 2024). Pharmacotherapy commonly involves angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers, calcium channel blockers, and thiazide diuretics (Muhadi, 2016). It generally requires long-term adherence and regular clinic visits, which can cause treatment fatigue, and concerns about the adverse effects of long-term synthetic drugs have encouraged many people to look to natural approaches (Hamdani et al., 2024). Non-pharmacological management emphasizes the Dietary Approaches to Stop Hypertension (DASH) pattern, sodium restriction, weight control, regular aerobic exercise, and avoidance of tobacco and alcohol (Wulandari & Cusmarih, 2024). Recent international guidance likewise places lifestyle modification at the center of the management of elevated blood pressure (McEvoy et al., 2024). Fresh fruits are a practical component of such dietary strategies. Several studies suggest that regular fruit intake lowers blood pressure and may slow progression to hypertension, and a number of trials have examined the effects of fruit-derived bioactive compounds in prehypertensive and hypertensive participants (Sulistiany, 2023). One tropical fruit of interest is red guava (Psidium guajava L.), a widely available and inexpensive fruit (Hadi, 2023; Mayang et al., 2025). It is reported to contain about 417 mg of potassium per 100 g, together with vitamin C, carotenoids including lycopene, and polyphenols such as flavonoids (Ismafiaty et al., 2024; Hussain, 2021). Several of these constituents have plausible antihypertensive actions. Potassium promotes renal sodium excretion and vascular smooth muscle relaxation, vitamin C supports endothelial nitric oxide availability, lycopene and other antioxidants limit lipid oxidation and arterial stiffening, and flavonoids such as quercetin have been reported to inhibit ACE (Hamdani et al., 2024; Hadi, 2023; Widiasari, 2018).

Evidence for red guava specifically in the workplace setting is limited. A previous Indonesian study examined red guava juice in adults with primary hypertension (Ismafiaty et al., 2024), and related work has evaluated other lycopene-rich foods such as tomato juice (Hamdani et al., 2024; Mayang et al., 2025). To our knowledge, little has been reported on whether red guava juice can modify blood pressure in working adults who are still in the prehypertensive stage, where preventive benefits would be most valuable. This study therefore aimed to describe blood pressure before and after seven days of red guava juice consumption among workers with prehypertension at CV Koranda Food, to test whether systolic and

diastolic pressure differ significantly before and after the intervention, and to characterize the pattern of change over time. The null hypothesis was that red guava juice has no effect on blood pressure; the alternative hypothesis was that it does.

Previous Studies

No.	Author (year)	Population and setting	Intervention	Main finding	Relevance to this study
1	Ismafiaty et al. (2024)	Adults with primary hypertension, Indonesia	Red guava juice	Blood pressure reduction after juice administration	Same intervention, but in established hypertension
2	Mayang et al. (2025)	Hypertensive patients, Aek Natolu Community Health Center, Toba Samosir	Tomato juice (lycopene-rich)	Blood pressure reduction in hypertensive patients	Related lycopene-rich food, North Sumatra setting
3	Hamdani et al. (2024)	Hypertensive patients, Indonesia	Cherry tomato (Solanum lycopersicum var. cerasiforme)	Changes in blood pressure after administration	Supports a lycopene and potassium mechanism
4	Sulistiany (2023)	Hypertensive patients, Paya Bujok Beuramo Village	Fruit intake	Fruit intake associated with lower blood pressure	Supports fruit-based dietary strategies
5	Saribu et al. (2021)	Older adults with hypertension, Bintan	Dark chocolate	Effect on blood pressure	Another food-based, non-drug approach
6	Hadi (2023)	Review of red guava potential	Red guava fruit	Potential for raising hemoglobin; describes the nutrient profile	Source of the guava composition and bioactives
7	**This study (2026)**	20 prehypertensive factory workers, CV Koranda Food	350 mL red guava juice daily for 7 days	Systolic fell 5.80 mmHg ($p < 0.001$); diastolic not significant ($p = 0.102$)	Fills the gap in prehypertensive workers

RESEARCH METHODS

Study design

We conducted a quasi-experimental study using a one-group pretest-posttest design without a control group. This approach is commonly applied when randomization or a concurrent comparison group is not feasible and the aim is to observe physiological change before and after a defined intervention (Anantasia & Rindrayani, 2025). All participants were measured at baseline, received the intervention, and were measured again during and at the end of the intervention period.

Setting and period

The study was carried out at the production facility of CV Koranda Food, Indonesia, among its active workers. Baseline measurement took place on 7 September 2026, followed by follow-up measurements on 8, 10, and 13 September 2026, corresponding to day 2, day 4, and day 7 of the intervention. The wider study protocol, including preparation and ethical review, was scheduled for the period July to September 2026.

Population and participants

The target population was finite and consisted of production-unit employees who met the initial prehypertension screening criteria, which identified 20 workers. Participants were selected by purposive (non-probability) sampling based on predefined eligibility criteria (Lulumanin & Fahrurodzi, 2025). Inclusion criteria were: (a) willingness to participate and provision of informed consent, (b) a status of prehypertension, (c) absence of comorbid disease complications, and (d) not currently taking antihypertensive medication. Exclusion criteria were: (a) absence from the workplace during the intervention sessions, (b) acute illness during the intervention period, and (c) non-cooperative behavior or difficulty in communication.

Participants who did not complete juice consumption continuously for the full seven days were treated as dropouts. All 20 participants completed the protocol, and no data were missing.

Intervention

The intervention was 350 mL of fresh red guava juice, consumed once daily for seven consecutive days. This dose followed the regimen used in earlier work on red guava juice in adults with hypertension (Ismafiaty et al., 2024). The juice was prepared on site using the following steps. Ripe red guavas of good quality were washed under running water and defective stem ends were removed. The flesh was cut into small pieces and processed in a juicer without any added sweetener. The extracted juice was separated from the coarse fibrous residue and measured in a graduated cylinder to a volume of exactly 350 mL before being served to each participant in a plastic cup. Preparation used knives, cutting boards, basins, a juicer, graduated cylinders, and disposable gloves and tissues to maintain hygiene.

Blood pressure measurement

Blood pressure was the outcome variable and was measured in mmHg with a calibrated sphygmomanometer. Baseline (pretest) measurement was taken during the work break before any juice was consumed. Follow-up measurements were taken on day 2 and day 4, two hours after juice consumption, to observe the intermediate hemodynamic response, and a final measurement was taken on day 7. At each time point, systolic and diastolic values were recorded as whole numbers.

Variables

The independent variable was red guava juice administration at 350 mL per day, measured in milliliters with a graduated cylinder. The dependent variables were systolic and diastolic blood pressure (interval scale, mmHg). Descriptive characteristics collected were sex, age, body weight, height, and body mass index (BMI), calculated as weight in kilograms divided by the square of height in meters.

Ethical considerations

The protocol followed accepted principles of biomedical research ethics: voluntary informed consent (autonomy), beneficence, non-maleficence, justice, and confidentiality of participant identity. Ethical clearance was sought from a health research ethics committee before the intervention began, and written permission was obtained from factory management. All participants signed informed consent forms after receiving an explanation of the study.

Statistical analysis

Data were analyzed using IBM SPSS Statistics. Univariate analysis described participant characteristics using frequencies, percentages, means, standard deviations, medians, and ranges. For bivariate analysis, the distribution of the paired differences (baseline minus day 7) was tested with the Shapiro-Wilk test. When the differences were normally distributed, the paired-samples t-test was used; when they were not, the Wilcoxon signed-rank test was used. The significance level was set at $p < 0.05$ (Zubiyo et al., 2025). As a complementary analysis of change across all four measurement points, the nonparametric Friedman test was applied. We also computed the standardized effect size for the paired systolic comparison (Cohen's d_z, the mean difference divided by the standard deviation of the differences) and the 95% confidence interval of the mean difference.

RESEARCH RESULTS AND DISCUSSION

Participant Characteristics

All 20 workers completed the seven-day intervention, and complete blood pressure data were available at all four time points. Women made up a slight majority of the sample, and the group consisted of working-age adults with a wide age range. Mean BMI was in the overweight range, although individual values ranged from normal weight to marked obesity (Table 1).

Table 1. Characteristics of respondents (N = 20)

Characteristic	Value
Sex, n (%)	
Male	9 (45.0)
Female	11 (55.0)
Age (years), mean ± SD	41.05 ± 12.07
Age, median (range)	43.50 (22.00 - 63.00)
Body weight (kg), mean ± SD	74.02 ± 16.91
Body weight, median (range)	71.00 (54.50 - 111.00)
Height (cm), mean ± SD	159.00 ± 7.74
Height, median (range)	159.50 (146.00 - 173.00)
BMI (kg/m^2), mean ± SD	29.19 ± 5.78
BMI, median (range)	28.77 (20.41 - 42.30)

Systolic blood pressure over time

At baseline, mean systolic pressure was 127.40 ± 3.62 mmHg, with individual values between 122 and 133 mmHg, which placed all participants within the prehypertensive range. Mean systolic pressure then declined at each subsequent measurement, to 124.10 ± 1.97 mmHg on day 2, 123.30 ± 1.63 mmHg on day 4, and 121.60 ± 1.67 mmHg on day 7 (Table 2). The decline was progressive, and the spread of values narrowed over time, as shown by the reduction in standard deviation from 3.62 to 1.67 mmHg. Nineteen of the 20 participants (95%) had a lower systolic pressure on day 7 than at baseline, while one participant showed no change.

Table 2. Systolic blood pressure at four measurement times (mmHg)

Time	Mean ± SD	Median	Minimum - maximum
Baseline	127.40 ± 3.62	130.00	122.00 - 133.00
Day 2	124.10 ± 1.97	124.50	120.00 - 128.00
Day 4	123.30 ± 1.63	123.00	120.00 - 125.00
Day 7	121.60 ± 1.67	122.00	120.00 - 125.00

Diastolic blood pressure over time

Mean baseline diastolic pressure was 81.00 ± 2.05 mmHg, with values between 80 and 85 mmHg. Over the intervention, mean diastolic pressure changed only marginally, to 80.25 ± 3.02 mmHg on day 2 and 80.00 ± 2.81 mmHg on days 4 and 7 (Table 3). Most participants (17 of 20) had identical diastolic readings at baseline and day 7. The three participants whose readings changed showed decreases of 5, 5, and 10 mmHg.

Table 3. Diastolic blood pressure at four measurement times (mmHg)

Time	Mean ± SD	Median	Minimum - maximum
Baseline	81.00 ± 2.05	80.00	80.00 - 85.00
Day 2	80.25 ± 3.02	80.00	70.00 - 85.00
Day 4	80.00 ± 2.81	80.00	70.00 - 85.00
Day 7	80.00 ± 2.81	80.00	70.00 - 85.00

Normality testing and choice of paired test

Because baseline and follow-up values came from the same individuals, paired tests were used. The Shapiro-Wilk test of the differences between baseline and day 7 supported normality for systolic pressure (W = 0.956, p = 0.458) but not for diastolic pressure (W = 0.447, p < 0.001) (Table 4). Accordingly, the paired-samples t-test was applied to systolic pressure and the Wilcoxon signed-rank test to diastolic pressure.

Table 4. Shapiro-Wilk test on the differences in blood pressure (baseline minus day 7)

Outcome	W	p	Decision
Systolic	0.956	0.458	Normality not rejected
Diastolic	0.447	< 0.001	Not normal

Change from baseline to day 7

Systolic pressure fell by a mean of 5.80 ± 2.82 mmHg between baseline and day 7 (range of individual reductions 0 to 10 mmHg). The paired-samples t-test indicated a highly significant difference (t = 9.195, df = 19, p < 0.001), and the 95% confidence interval for the mean reduction was 4.48 to 7.12 mmHg. This corresponds to a relative decrease of about 4.6% from the baseline mean and a very large standardized effect (Cohen's d_z of approximately 2.06). For diastolic pressure, the mean change was 1.00 ± 2.62 mmHg. The Wilcoxon signed-rank test found three positive ranks (rank sum 6), no negative ranks, and 17 ties (Z = -1.633, p = 0.102), so the diastolic change was not statistically significant (Table 5).

Table 5. Blood pressure change between baseline and day 7

Outcome	Mean reduction ± SD	Test and statistic	p
Systolic	5.80 ± 2.82	Paired t-test, t = 9.195, df = 19	< 0.001
Diastolic	1.00 ± 2.62	Wilcoxon signed-rank, Z = -1.633	0.102

Analysis across four measurement times

The Friedman test, which compares all four measurement times, showed a significant change in systolic pressure over the intervention period (χ^2 = 51.675, df = 3, p < 0.001). For diastolic pressure, no significant change across the four time points was detected (χ^2 = 5.143, df = 3, p = 0.162) (Table 6). Post hoc pairwise comparisons were not performed.

Table 6. Friedman test across the four measurement times

Outcome	Friedman χ^2 (df = 3)	p
Systolic	51.675	< 0.001
Diastolic	5.143	0.162

Discussion

Principal findings

In this group of 20 workers with prehypertension, seven days of daily red guava juice consumption was accompanied by a statistically significant and consistent fall in systolic blood pressure of about 5.8 mmHg, whereas diastolic pressure did not change significantly. The systolic pattern was robust across analytical approaches. The paired comparison between baseline and day 7 was highly significant, the Friedman test confirmed a significant trend across four measurement times, 95% of participants improved, and the confidence interval of the mean reduction excluded zero by a wide margin. The reduction was also clinically interpretable. Observational and trial data on blood pressure consistently show that even modest systolic reductions at population level are associated with fewer cardiovascular events, and a reduction of this order is comparable to what is achieved with some single lifestyle

measures such as sodium restriction (Wulandari & Cusmarih, 2024; Carey et al., 2021). However, the design of this study does not allow the reduction to be attributed to the juice with certainty, as discussed below.

Baseline status and sample characteristics

All participants were in the prehypertensive range at baseline, with systolic values from 122 to 133 mmHg and diastolic values of 80 to 85 mmHg. This is a stage at which structural changes in the vascular wall may begin even though drug therapy is not usually indicated (Rahayu & Budiasti, 2022). The sample consisted of middle-aged working adults, with a mean age of 41 years, and an average BMI of 29.19 kg/m^2, which is in the overweight range and reached the obese range in several individuals. Age, excess adiposity, physically demanding work, and workplace stress are all recognized contributors to heightened sympathetic vascular tone and rising blood pressure (Zubiyo et al., 2025; Octavianie et al., 2022). Identifying and intervening at the prehypertensive stage is therefore important to reduce the rate of progression to established hypertension, and workplace-based dietary interventions are a feasible way of reaching this population (Zubiyo et al., 2025).

Systolic blood pressure

The systolic reduction observed here is consistent with earlier reports that fruit rich in potassium and flavonoids promotes vascular relaxation. Ismafiaty et al. (2024) found that red guava juice lowered blood pressure in adults with primary hypertension, and Sulistiany (2023) reported that fruit intake was associated with blood pressure reduction in hypertensive patients. Related studies of lycopene-containing foods, such as tomato products, have also reported favorable blood pressure effects in hypertensive populations (Hamdani et al., 2024; Mayang et al., 2025). Our results extend this literature to people at an earlier stage, namely prehypertensive workers, which is notable because the potential for prevention is greatest before hypertension is established. The uniformity of the systolic response deserves comment. The standard deviation of systolic pressure fell from 3.62 mmHg at baseline to 1.67 mmHg at day 7, indicating convergence of readings toward a narrow band. Participants with the highest baseline values (130 mmHg or above) showed the largest falls, with reductions of 8 to 10 mmHg in several cases, while those who began near 122 to 125 mmHg changed little. This pattern is compatible with a biological effect that is proportionally greater at higher pressures, but it is also the pattern expected from regression toward the mean when participants are selected because of elevated readings. It is also relevant that no participant fell below 120 mmHg at any follow-up point, and several readings clustered exactly at 120 mmHg, which suggests that the measured values approached the lower boundary of the prehypertensive range and could not fall far below it in this population.

Plausible biological mechanisms

Several mechanisms may explain how red guava juice could lower systolic pressure, although none was measured directly in this study and the following discussion is therefore hypothesis-generating.

Potassium and natriuresis

Red guava contains substantial potassium, reported at about 417 mg per 100 g (Ismafiaty et al., 2024), while being low in sodium. Inadequate potassium intake is associated with higher systemic blood pressure (Kurniyanti et al., 2022). Greater potassium intake promotes renal sodium excretion through effects on tubular transport, including activity of the Na^+/K^+-ATPase

pump, which helps restore intravascular volume, and it also relaxes vascular smooth muscle (Kurniyanti et al., 2022; Hussain, 2021). A high potassium to sodium ratio is a well-established feature of blood-pressure-lowering diets such as DASH (Wulandari & Cusmarih, 2024).

Vitamin C and endothelial function

Red guava is a rich source of ascorbic acid. Vitamin C acts as a cofactor in collagen synthesis for the vessel wall and helps maintain tetrahydrobiopterin, which prevents uncoupling of endothelial nitric oxide synthase and thereby preserves nitric oxide production, the principal endogenous vasodilator (Hadi, 2023). Preserved nitric oxide signaling would be expected to reduce peripheral vascular resistance, which determines much of systolic load.

Flavonoids and ACE inhibition

Polyphenols present in guava, including quercetin, kaempferol, and gallic and ellagic acids, are potent free-radical scavengers that reduce oxidative stress in vascular cells (Hamdani et al., 2024; Ismafiaty et al., 2024). Quercetin and related flavonoids have also been reported to inhibit angiotensin-converting enzyme, which reduces the formation of the vasoconstrictor angiotensin II and lowers peripheral resistance (Widiasari, 2018; Hamdani et al., 2024). This is the same pathway targeted by ACE inhibitors, which are first-line antihypertensive drugs (Muhadi, 2016), although the effect of dietary flavonoid intake is expected to be far smaller.

Lycopene, antioxidants, and lipid balance

The red flesh of the fruit is pigmented by lycopene and other carotenoids. Dietary antioxidant vitamins and carotenoids help limit oxidation of low-density lipoprotein in the arterial intima, which reduces foam cell formation and may slow the arterial stiffening that elevates systolic pressure (Hamdani et al., 2024). Lycopene has been proposed to help modulate vascular smooth muscle tone and to protect against arterial sclerosis (Hamdani et al., 2024). In addition, the soluble fiber (pectin) in guava slows carbohydrate absorption and has a low glycemic impact, which may reduce postprandial hyperinsulinemia, a state linked to renal sodium retention and sympathetic activation (Hussain, 2021). Because the juice was prepared by juicing and separating the coarse residue, the fiber content delivered to participants may have been lower than that of whole fruit, so this last mechanism may have contributed less in our setting.

Diastolic blood pressure

Diastolic pressure did not change significantly. Most participants (17 of 20) showed identical diastolic readings at baseline and day 7, and the average change of 1.00 mmHg was driven by only three individuals. Several explanations are plausible. First, diastolic pressure reflects peripheral resistance in the microcirculation and the arterioles, and changes in this component may require longer exposure and more gradual structural adaptation than the functional relaxation that may suffice to influence systolic pressure (Wulandari & Cusmarih, 2024). Second, baseline diastolic values were already low, between 80 and 85 mmHg, at the very threshold of the prehypertensive range, leaving little room for measurable reduction. Third, the sample was small and the Wilcoxon test with only three non-tied pairs has low statistical power, so a modest diastolic effect could easily have gone undetected. Finally, blood pressure was recorded in whole millimeters, and diastolic readings were concentrated at 80 and 85 mmHg, so the measurement resolution was coarse relative to the size of effect being sought. Thus, the non-significant diastolic result should not be interpreted as proof that red guava juice has no effect on diastolic pressure; rather, it indicates that no effect could be demonstrated under the conditions of this brief, small, uncontrolled study (Zubiyo et al., 2025).

Practical implications

If confirmed, these findings would have practical relevance for occupational health. Red guava is inexpensive, widely available in tropical regions, and culturally familiar, and unsweetened juice can be prepared with simple equipment. For prehypertensive workers, incorporating such a food into daily routine might serve as one component of a broader lifestyle program that also includes sodium reduction, regular aerobic exercise, weight control, and avoidance of tobacco and alcohol (Wulandari & Cusmarih, 2024). Employers and occupational health providers could combine such nutritional measures with routine blood pressure screening to detect progression early (Zubiyo et al., 2025). It is important to emphasize, however, that dietary measures of this kind are complementary and should not replace pharmacological treatment prescribed by a clinician when it is indicated (Carey et al., 2021). Individuals with diabetes or kidney disease should also seek medical advice before increasing intake of potassium-rich or sugar-containing juices, given that the juice delivers a meaningful potassium and fruit sugar load.

Strengths and limitations

The study has several strengths. It was conducted in a real workplace, it used a standardized, measured dose of juice prepared without added sweetener, it recorded blood pressure at four time points rather than only at the beginning and end, and there was no loss to follow-up. The convergent results of the parametric paired test and the nonparametric Friedman test strengthen confidence in the systolic finding, and the choice of test for each outcome was based on a formal normality assessment. The limitations are, however, substantial and must be considered when interpreting the results. First, the one-group pretest-posttest design has no control group, so the change cannot be attributed to the juice alone. Regression to the mean, familiarization with the measurement procedure, reduced anxiety on repeated measurement, the attention participants received, and changes in diet, activity, or work stress during the study week could each account for part of the observed decline. Second, the sample was small (n = 20), drawn purposively from a single workplace, which limits generalizability and statistical power, particularly for diastolic pressure. Third, the intervention lasted only seven days, so the durability of any effect and the effect on diastolic pressure over longer exposure remain unknown. Fourth, follow-up measurements on days 2 and 4 were taken two hours after juice consumption, whereas the timing relative to juice intake on day 7 was not specified in the protocol, so acute postprandial effects and sustained effects cannot be clearly separated. Fifth, potentially confounding variables, such as daily salt intake, physical activity, sleep, and stress at work, were not recorded or controlled, and the nutrient content of the juice (for example its actual potassium concentration) was not analyzed in the laboratory. Sixth, blood pressure was recorded in whole millimeters with a clustering of values at certain numbers (for example 120 and 125 mmHg), which indicates limited measurement resolution and the possibility of digit preference. Finally, the assessors and participants were not blinded. These limitations suggest that the findings should be regarded as preliminary.

Recommendations for future research

Future studies should use a randomized controlled design with a parallel control group receiving a placebo or an isocaloric juice without the guava's active constituents, with allocation concealment and, where possible, blinded outcome assessment. Intervention periods should extend well beyond one week, ideally several weeks to months, to assess diastolic effects and durability. Blood pressure should be measured with standardized, validated protocols, ideally using automated devices or ambulatory monitoring, at fixed times relative to juice intake.

Studies should record dietary sodium and potassium intake, physical activity, body weight, and work stress as covariates, and should include biochemical markers such as serum and urinary potassium, lipid profile, and oxidative stress or nitric oxide markers to test the proposed mechanisms. Larger and more diverse samples, including participants with stage 1 hypertension, would also allow evaluation of dose-response relationships and subgroup differences by sex, age, and BMI.

CONCLUSION

In workers with prehypertension at CV Koranda Food, daily consumption of 350 mL of red guava juice for seven days was associated with a statistically significant mean reduction in systolic blood pressure of 5.80 mmHg (95% CI 4.48 to 7.12 mmHg; $p < 0.001$), from 127.40 to 121.60 mmHg, with 95% of participants showing improvement. Diastolic pressure did not change significantly (81.00 to 80.00 mmHg; $p = 0.102$) over this short period. Because the study was small, uncontrolled, and brief, the results suggest rather than prove an effect of red guava juice, and they should not be taken as a substitute for prescribed therapy. Red guava juice may be considered a low-cost complementary dietary option within a broader healthy lifestyle for prehypertensive adults, and the findings justify larger randomized controlled trials with longer follow-up to confirm the effect and clarify its mechanisms.

The novelty of this study lies in its empirical investigation of red guava (Psidium guajava) juice as a functional food-based intervention for blood pressure management among workers with prehypertension in an industrial occupational setting. Unlike previous studies that have predominantly examined general fruit consumption or dietary interventions among broader community populations, this study specifically integrates unsweetened red guava juice consumption into an occupational health context through a structured intervention of 350 mL daily for seven consecutive days, accompanied by serial blood pressure assessments. The finding of a statistically significant reduction in systolic blood pressure of 5.80 mmHg, without a significant change in diastolic blood pressure, provides preliminary evidence of a potentially selective cardiovascular response to this dietary intervention. The original contribution of this research is its introduction of a locally available, nutrient-rich functional food as a potentially accessible and practical strategy for promoting cardiovascular health and preventing hypertension among industrial workers. Furthermore, the findings highlight the need for more rigorous controlled studies involving larger samples, comparison groups, and longer intervention periods to establish the effectiveness, sustainability, and underlying physiological mechanisms of red guava juice in blood pressure regulation.

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