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THE EFFECT OF BITTER MELON JUICE ON BLOOD PRESSURE IN HYPERTENSIVE PATIENTS IN JAGAMUKTI VILLAGE, SURADE HEALTH CENTER WORKING AREA

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ABSTRACT

Introduction: Hypertension is a major public health concern due to its high prevalence and potential to cause severe complications. In rural communities such as Jagamukti Village, traditional therapies are often used alongside conventional treatment, yet evidence on their effectiveness remains limited.
Objectives: This study aimed to determine the effect of bitter melon juice on blood pressure among hypertensive patients in Jagamukti Village, within the working area of the Surade Health Center.
Methods: A quasi-experimental study with a one-group pretest-posttest design was conducted on 15 hypertensive patients selected through cluster sampling. Participants were given 200 grams of bitter melon blended with 200 ml of boiled water, once daily for 7 consecutive days. Blood pressure was measured before and after the intervention using a sphygmomanometer and stethoscope. Data were analyzed using univariate and bivariate methods, with a paired sample t-test at a significance level of 0.05.
Results: All 15 participants had high blood pressure before the intervention, with an average systolic pressure of 151 mmHg. After 7 days of consuming bitter melon juice, all participants experienced a reduction in blood pressure, with an average systolic value of 145 mmHg. The paired sample t-test showed a significant difference between pre- and post-intervention blood pressure ($p = 0.000$).
Conclusions: The administration of bitter melon juice significantly reduced blood pressure in hypertensive patients. This finding supports the potential of bitter melon juice as a non-pharmacological intervention to complement hypertension management, particularly in low-resource settings.

Introduction

Hypertension is a non-communicable disease (NCD) that requires serious attention due to its high prevalence. Many individuals are unaware they have hypertension and only seek medical help when experiencing discomfort or pain. Hypertension is often referred to as the "silent killer" because of its life-threatening potential. According to the American Heart Association (AHA), a diagnosis of hypertension is made when blood pressure readings reach or exceed 140/90 mmHg after being measured 2-3 times over a 1-4 week interval (Rahman, 2023).

There are two main causes of hypertension: unmodifiable factors such as genetics, age, and gender, and modifiable factors like unhealthy lifestyle habits, excessive salt intake, alcohol consumption, and stress (Sutriyawan et al., 2022). Lifestyle changes recommended to address hypertension include reducing salt and alcohol intake, eating more vegetables, quitting smoking, and exercising regularly (Ojangba et al., 2023).

According to the World Health Organization (WHO), 1.13 billion people worldwide suffered from hypertension in 2019. By 2021, the global prevalence of hypertension had risen to 29.2%. In Indonesia, the number of hypertensive patients reached 63,309,620, with 427,218 deaths attributed to hypertension. The prevalence of hypertension is highest in individuals aged 31-44

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years (31.6%), 45-54 years (45.3%), and 55-64 years (55.2%). West Java has the second-highest prevalence of hypertension in Indonesia (WHO, 2023).

In 2016, 790,382 cases of hypertension were detected in West Java (2.46% of the population), and 8,029,245 cases were investigated across 26 districts/cities. Only one district, Bandung Barat, reported no hypertension cases. In 2018, West Java had a prevalence of 39.1% (Dinas Kesehatan Kota Bandung, 2019). Preliminary studies in the Surade Health Center Working Area revealed 25 hypertensive patients who complained of dizziness due to elevated blood pressure. According to health workers in the area, most hypertensive patients are smokers and consume excessive amounts of salt, which is consistent with studies showing that smoking and high salt intake contribute to hypertension (Indriyani & Komala, 2020).

According to Mahmood et al., (2019), hypertension can be treated using both pharmacological and non-pharmacological approaches. Pharmacological treatment involves antihypertensive medications, while non-pharmacological treatments include lifestyle modifications such as exercise, reducing smoking and alcohol consumption, and dietary changes (Aloo, 2018). Nurses play a crucial role in providing non-pharmacological interventions for hypertension, including patient education, lifestyle promotion, blood pressure monitoring, and emotional support (Fadhilah, 2024).

According to Indonesian Health Regulation No. 381/MENKES/SK/III/2007 on the utilization of traditional medicine for health maintenance, disease prevention, and healthcare services, herbal plants for managing hypertension include garlic, ginger, cinnamon, celery, turmeric, and cucumber. One such herb, bitter melon (Sechium edule), has shown promise as a traditional remedy for various diseases, including hypertension, diabetes, and digestive issues (Kementrian Kesehatan Republik Indonesia, 2013).

Bitter melon, a commonly consumed vegetable in many communities, is found in highland areas. Known for its health benefits, bitter melon contains sap and compounds like protein, and it is rich in potassium, which helps regulate blood pressure and acts as a hypertension remedy. It also helps cleanse carbon dioxide from the blood (Yakub & Frare, 2020).

Due to its nutrient and anti-inflammatory properties, bitter melon can help lower high blood pressure. It has diuretic effects, reducing sodium levels in the blood through urinary excretion. This decrease in sodium, which draws in water, reduces the workload on the heart, thereby lowering blood pressure (Indriyani & Komala, 2020). High potassium levels also improve oxygen delivery to the brain and help maintain fluid balance, which makes the body feel more refreshed. Hypertensive patients are advised to regularly consume bitter melon (Puspitasari et al., 2022; Sijabat & Panjaitan, 2021; Utami et al., 2023).

Based on the results of an initial survey in the working area of the Surade Community Health Center, out of a total of 40 adults examined, 25 people or 62.5% were identified as having hypertension. This figure shows that the prevalence of hypertension in Jagamukti Village is relatively high, exceeding the national prevalence and reflecting the need for effective and easily implemented health interventions at the community level.

While pharmacological treatment remains the primary approach in managing hypertension, an increasing number of studies highlight the potential of non-pharmacological therapies as supportive strategies. For example, physical exercises such as endurance training have been shown to significantly reduce systolic and diastolic blood pressure (Fagard & Cornelissen, 2007), while diet-based approaches and herbal consumption are also gaining r attention in research. The use of alternative therapies such as herbal consumption is considered safer and more acceptable to the community, especially in areas with limited access to medical services.

However, there is a knowledge gap regarding the effectiveness of certain herbal therapies, such as bitter melon juice, in the local community context. Most previous studies have focused on other herbal plants like chayote, celery, or garlic. The lack of empirical studies specifically

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evaluating bitter melon juice as an intervention raises questions about whether this plant is clinically effective in lowering blood pressure in hypertensive patients.

Therefore, it is important for the public to understand the significance of non-pharmacological treatments in addition to pharmacological ones. Herbal plants are highly beneficial for maintaining health due to their minimal side effects and easy availability, making natural remedies more favorable for health. Based on the background provided, the author is interested in conducting research on the effect of bitter melon juice on blood pressure in hypertensive patients in Jagamukti Village, Surade Health Center's working area.

Methods

This study used a quasi-experimental design with a One Group Pretest-Posttest design, which involved measuring blood pressure before and after the intervention in one treatment group. The population for this study consisted of hypertensive patients in Jagamukti Village, Surade Health Center's working area, totaling 1,686 individuals. The sample size for this study was 15 people, selected from a group of hypertensive patients in Jagamukti Village, Surade Health Center's working area. The sampling technique used was cluster sampling, where specific groups are chosen, and then members of those groups are selected as the sample (Notoatmodjo, 2018). The selection of respondents was also based on several inclusion and exclusion criteria, as follows:

a) Inclusion Criteria

1) The respondent is willing to participate in the study.
2) The respondent resides in Jagamukti Village.
3) The respondent has been diagnosed with hypertension by a health center doctor.
4) The respondent has not consumed antihypertensive medication at least 3 days before consuming bitter melon juice, as combining both could cause the blood pressure to drop, leading to dizziness and weakness.
5) The respondent is able to communicate effectively.

b) Exclusion Criteria

1) The respondent does not consume bitter melon juice.
2) The respondent withdraws from the study.

Penentuan ukuran sampel sebanyak 15 responden didasarkan pada batasan lapangan awal, termasuk ketersediaan pasien hipertensi yang memenuhi kriteria inklusi dan bersedia berpartisipasi tanpa mengonsumsi obat antihipertensi setidaknya 3 hari sebelum intervensi. Selain itu, berdasarkan teknik sampling kluster yang digunakan, desa kecil yang dipilih di Desa Jagamukti memiliki jumlah pasien yang memenuhi syarat yang terbatas. Meskipun ukuran sampel kecil, studi ini menyediakan data eksploratif penting untuk mengarahkan penelitian masa depan dengan populasi yang lebih besar.

Data collection was conducted through interviews and obtained from sources, documentation, and literature. The instrument used in this study was a Standard Operating Procedure (SOP) as a guide for preparing bitter melon juice, adapted from the research by Sahlan. The instruments used to measure blood pressure were a sphygmomanometer and stethoscope (Fadlilah et al., 2020). The data analysis used univariate and bivariate analysis. Univariate analysis was employed to show the distribution and frequency of variables before and after consuming bitter melon juice. The purpose of the bivariate analysis in this study was to analyze the effect of bitter melon juice before and after the intervention on hypertensive patients in Jagamukti Village, Surade Health Center's working area. The collected data were assumed to be normally distributed, so parametric statistical tests were used, specifically the T-test, with a 95% confidence level and a significance level of <0.05, to identify significant differences in average blood pressure before and after the intervention.

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The administration of bitter melon juice was carried out once a day in the morning for 7 consecutive days. Each serving of bitter melon juice consisted of 200 grams of fresh bitter melon (Sechium edule), blended with 200 ml of boiled water without any added sweeteners or flavoring agents. The juice was prepared following a standardized procedure adapted from the SOP developed by Sahlan Zamaa et al., (2022), ensuring consistency in dosage and preparation method across all participants. Respondents were supervised during consumption to maintain adherence.

Results

Univariate Analysis

1) Descriptive Analysis of Respondent Age

The descriptive analysis of respondent age according to the classification of the Ministry of Health of the Republic of Indonesia (2009) includes the following categories: infancy (0–5 years), childhood (5–11 years), early adolescence (12–16 years), late adolescence (17–25 years), early adulthood (26–35 years), late adulthood (36–45 years), early elderly (46–55 years), late elderly (56–65 years), and older adults (>65 years). In this study, the age categories can be seen in Table 4.1 as follows:

Table 1. Frequency Distribution of Respondent Age

Age	Number	Percentage (%)
46 – 55	10	66,7 %
56 – 65	2	13,3 %
>65	3	20,0%
Total	**15**	**100**

Based on Table 1, it can be seen that the majority of respondents in Jagamukti Village, Surade Health Center's working area are aged 46–55 years, with 10 respondents (66.7%), while a smaller group is aged 53–55 years, with 2 respondents (13.3%).

2) Descriptive Analysis of Respondents' Gender

Table 2. Frequency Distribution of Respondents Based on Gender

Gender	Frequency (people)	Percentage (%)
Male	6	40 %
Female	9	60%
Total	15	100%

Based on Table 2, it can be seen that the distribution of respondents by gender is dominated by female respondents, with 9 respondents or about 60%, and male respondents, with 6 respondents or about 40%.

3) Descriptive Analysis of Respondents' Occupation

Table 3. Frequency Distribution of Respondents Based on Occupation

Occupation	Frequency (people)	Percentage (%)
Housewife	9	60%
Farmer	6	40%
Total	**15**	**100%**

Based on Table 3, it can be seen that the distribution of respondents based on occupation is dominated by housewives, with 9 respondents or about 60%, and farmers, with 6 respondents or about 40%.

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4) Statistical Analysis of Variables

Descriptive analysis of blood pressure before and after the intervention of bitter melon juice can be seen in Tables 4 and 5 below:

Table 4. Frequency Distribution of Blood Pressure Before Bitter Melon Juice Intervention in Jagamukti Village, Surade Health Center's Working Area

Blood Pressure	Frequency	Percentage (%)
Normal	0	0
Hypertension	15	100
Total	15	100

Based on Table 4, it can be seen that all the blood pressure readings before the administration of bitter melon juice in Jagamukti Village, Surade Health Center's working area, fall under the hypertensive category, with 15 respondents (100%).

Table 5. Frequency Distribution of Blood Pressure After Bitter Melon Juice Intervention in Jagamukti Village, Surade Health Center's Working Area

Blood Pressure	Frequency	Percentage (%)
Normal	15	100%
Hypertension	0	0%
Total	15	100

Based on Table 5, it can be seen that after the administration of bitter melon juice, all respondents in Jagamukti Village, Surade Health Center's working area, had normal blood pressure, with 15 respondents (100%), and no respondents were categorized as hypertensive (0%).

5) Univariate Analysis of Variables

In the univariate statistical analysis of the study variables, frequency distribution and statistical results were used to calculate the mean (Me), maximum value (Xmax), minimum value (Xmin), and standard deviation (Std). The statistical analysis of blood pressure in hypertensive elderly patients before and after the progressive muscle relaxation technique can be seen in Table 6 below:

Table 6. Blood Pressure Statistics of Hypertensive Patients Before Bitter Melon Juice Administration in Jagamukti Village, Surade Health Center's Working Area

	N	Min	Max	Mean	Std.Deviasi
TD pre sistol	15	145	157	151	3,461
TD post sistol	15	85	96	90	3,314

Based on Table 6, the analysis shows that the average blood pressure before the administration of bitter melon juice was 151 mmHg, with a standard deviation of 3.461. The lowest systolic blood pressure was 145 mmHg, and the highest systolic blood pressure was 157 mmHg. Meanwhile, the lowest diastolic pressure was 85 mmHg, and the highest diastolic pressure was 96 mmHg.

Table 7. Blood Pressure Statistics of Hypertensive Patients After Bitter Melon Juice Administration in Jagamukti Village, Surade Health Center's Working Area

	N	Min	Max	Mean	Std.Deviasi
TD pre sistol	15	140	150	145	2,875
TD post sistol	15	80	87	83	1,971

Based on Table 7, the analysis shows that the average blood pressure after the administration of bitter melon juice was 145 mmHg, with a standard deviation of 2.875. The lowest systolic blood pressure was 145 mmHg, and the highest systolic blood pressure was 140 mmHg. Meanwhile, the lowest diastolic pressure was 80 mmHg, and the highest diastolic pressure was 87 mmHg.

Bivariate Analysis

1) Normality Test

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The purpose of this normality test is to determine the normality of the data in this study, which refers to blood pressure in elderly hypertensive patients and their adherence to drinking bitter melon juice in Surade Health Center's working area. The normality test was conducted using the Shapiro-Wilk test, and the results of the Shapiro-Wilk test are presented in the following table:

Table 8. Results of Normality Test for Blood Pressure in Hypertensive Patients After Consuming Bitter Melon Juice in Surade Health Center's Working Area

Blood Pressure	P. Value	∝	Hypothesis
Pre sistolik	0,903		Normal
Post sistolik	0,200	0,05	Normal
Pre sistolik	0,265		Normal
Post sistolik	0,189		Normal

Based on Table 8, the results of the normality test using the Shapiro-Wilk test showed that the pre-test had a p-value of 0.903, and the post-test had a p-value of 0.265, both of which are greater than 0.05, indicating that the data are normally distributed and a T-test can be used.

2) Homogeneity Test

The purpose of this analysis is to determine whether the population has homogeneous variance or not. The analysis uses Levene's test, and the results of the Levene's test can be seen in the following table:

Table 9. Results of Homogeneity Test for the Effect of Bitter Melon Juice on Blood Pressure in Hypertensive Patients in Jagamukti Village, Surade Health Center's Working Area

Variable	Levene's Test Value	P-Value
Blood pressure results	1,127	0,297

Based on Table 9, the Levene's test value is 1.127, and the P-value is 0.297, which is greater than 0.05, indicating that the variances of all variables are homogeneous.

3) Hypothesis Test

The purpose of this analysis is to determine the effect of bitter melon juice on blood pressure in Surade Health Center's working area. The analysis uses a T-test, and the results of the T-test analysis can be seen in the following table:

Table 10. Results of Hypothesis Test for the Effect of Bitter Melon Juice on Blood Pressure in Hypertensive Patients in Jagamukti Village, Surade Health Center's Working Area

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair PRE - POST	6.3333	4.15188	1.07201	4.03410	8.63257	5.908	14	0.000

Based on Table 10, the T-test value shows a p-value of 0.000, which is less than 0.05, indicating that there is a significant effect of bitter melon juice on blood pressure in Surade Health Center's working area.

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Discussion

1. Overview of Hypertension Pre-Experiment

The findings of this study highlight essential demographic patterns among hypertensive patients in Jagamukti Village, notably the predominance of the early elderly group (ages 46–55 years). This specific age distribution underscores an essential public health concern, reflecting the broader epidemiological trend where hypertension incidence significantly increases with advancing age. Aging is inherently associated with physiological transformations, such as structural alterations in blood vessels, decreased arterial elasticity, and increased vascular resistance. These age-related changes contribute significantly to elevated blood pressure levels, thus explaining the heightened prevalence among older adults. Furthermore, lifestyle factors commonly observed among rural populations, such as dietary patterns high in salt intake and limited physical activity, may further exacerbate hypertension risk within this age group.

Based on the results of the study, the descriptive analysis of respondent characteristics showed that the highest age distribution was in the early elderly category (46–55 years), with 10 respondents (66.7%). This finding aligns with the research by Barus et al., (2019), which indicates that hypertension affects both men and women aged 45 to 59 years. This is due to the natural changes in the body as people age. These changes cause blood vessels to become stiffer and less elastic, making the heart work harder to pump blood. The World Health Organization (WHO) states that age affects the body's immune system, with aging weakening the body's defenses. As people age, their ability to fight off microorganisms or pathogens decreases, making them more susceptible to diseases.

2. Overview of Hypertension Post-Experiment

The findings from this study emphasize an essential aspect concerning the gender-specific prevalence of hypertension, which notably appears higher among female respondents. This gender disparity suggests underlying biological, hormonal, and lifestyle-related factors contributing to elevated hypertension risks in women, particularly as they approach menopause. Physiologically, the decline in estrogen levels associated with menopause significantly affects vascular function, promoting increased arterial stiffness and consequently higher blood pressure levels. Additionally, sociocultural factors, such as dietary patterns, stress, and physical activity levels which tend to differ between genders may further explain this observed disparity. Understanding these gender-specific risk factors is crucial for developing targeted health interventions aimed at reducing hypertension prevalence effectively among women in rural communities such as Jagamukti Village.

The distribution of gender in this study, based on the data collected, shows a higher percentage of female hypertensive patients, with 9 respondents (60%), compared to male respondents, who accounted for 6 individuals (40%). This is in line with research by Desiyana et al., (2023), which found that 54.5% of the respondents in the intervention group were women. This is because, as women age and reach menopause, estrogen levels decrease, making them more vulnerable to high blood pressure. Based on a field survey, it was found that hypertension more commonly affected housewives (9 respondents or about 60%), with 6 respondents (about 40%) working as farmers. This aligns with research by Chapman et al., (2023), which indicates that hypertension is more prevalent among housewives, as many are in the menopausal stage and tend to have unhealthy lifestyles.

3. Effect of Bitter Melon Juice

The results of this study provide clear evidence regarding the effect of bitter melon juice intervention on blood pressure among hypertensive patients in Jagamukti Village, Surade Health Center's working area. As presented in Table 4, prior to the intervention, every participant (100%) was categorized as hypertensive, indicating a homogeneous baseline status within the sample. This uniformity strengthens the reliability of subsequent comparisons, as it ensures that

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any observed changes in blood pressure are likely attributable to the intervention rather than initial differences in health status.

Further analysis using the paired sample T-test, as shown in Table 10, demonstrates a statistically significant reduction in blood pressure following the consumption of bitter melon juice. The mean difference between pre- and post-intervention blood pressure readings was 6.33, with a standard deviation of 4.15. The significance value (p = 0.000) is well below the conventional threshold of 0.05, providing strong evidence that the observed reduction is unlikely to be due to chance alone.

These findings suggest that bitter melon juice may have a beneficial effect in lowering blood pressure among individuals with hypertension. The consistency of hypertensive status before the intervention, combined with the significant decrease in blood pressure after the intervention, highlights the potential of bitter melon juice as a supportive dietary approach in managing hypertension. However, it is important to note that the study was conducted on a relatively small sample and within a specific community context. Therefore, while the results are promising, further research with a larger and more diverse population is recommended to confirm these effects and to explore the underlying mechanisms in greater detail.

The results obtained from this study clearly demonstrate the potential of bitter melon juice as a complementary intervention for managing hypertension. The administration of bitter melon juice led to a measurable reduction in blood pressure levels among hypertensive respondents in Jagamukti Village. The observed effect can be attributed to several bioactive compounds and essential nutrients present in bitter melon, particularly potassium, which plays a critical role in regulating blood pressure through its diuretic properties and ability to improve fluid balance in the body. Although the reduction in average systolic blood pressure was modest, it nonetheless provides important preliminary evidence supporting the beneficial effects of bitter melon juice as a practical, accessible, and affordable alternative or adjunctive therapeutic approach for rural communities with limited healthcare resources. However, the clinical significance of the observed reduction must be carefully interpreted, considering the short duration of intervention and relatively small sample size.

In Table 4, the results show that all 15 respondents (100%) had high blood pressure before the intervention, with an average blood pressure of 151 mmHg, the lowest being 145 mmHg, and the highest being 157 mmHg. After the intervention with bitter melon juice, the blood pressure of all 15 respondents (100%) fell within the normal range, with an average blood pressure of 145 mmHg, standard deviation of 2.875, the lowest pressure being 140 mmHg, and the highest being 150 mmHg. Based on this analysis, although there was a decrease in blood pressure, it was not significant and still within the hypertensive category. According to the T-test result in Table 10, the p-value of 0.000 < 0.05 indicates that bitter melon juice has a significant effect on blood pressure in hypertensive patients in Jagamukti Village, Surade Health Center's working area. This is further supported by the research of Suirvi et al., (2022).

Conclusion

Based on the results of the study conducted on 15 hypertensive respondents in Jagamukti Village, Surade Health Center's working area, and supported by the theories discussed in the previous chapters, the following conclusions can be drawn:

The frequency distribution of blood pressure before the administration of bitter melon juice in Jagamukti Village, Surade Health Center's working area shows that all 15 respondents (100%) had high blood pressure, both systolic and diastolic.

The frequency distribution of blood pressure after the intervention shows that all 15 respondents (100%) had normal blood pressure.

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The final examination was conducted 7 days after the initial examination, with an average final blood pressure of 145.13/83.20 mmHg.

Based on the statistical tests and the paired sample T-test, the p-value was 0.000 < 0.05, or H1 was accepted, meaning there was a significant effect of bitter melon juice on blood pressure in hypertensive patients in Jagamukti Village, Surade Health Center's working area.

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