

The Effect Of Consuming Cucumber Juice On Reducing Blood Pressure In Hypertension

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ABSTRACT

Hypertension can lead to various serious health complications, including heart disease and stroke. One non-pharmacological treatment is the use of natural ingredients such as cucumber (*Cucumis sativus* Linn.), which is known to contain potassium to lower blood pressure. Effective hypertension management can reduce the risk of complications. This study was designed to evaluate the effect of cucumber juice on lowering blood pressure in hypertensive patients. To achieve this objective, the study used a quantitative method with a quasi-experimental design involving pretest and posttest measurements in both the treatment and control groups. This study involved 68 hypertensive patients from the Tanak Beak Community Health Center area who were selected through purposive sampling. The participants were then allocated to the intervention and control groups. For data collection, the instruments used included an observation sheet, a stethoscope, and a tested sphygmomanometer. The bivariate test used was the Wilcoxon test. The study results revealed a significant decrease in blood pressure in the intervention group (p -value = 0.000 or <0.05), while there was no significant change in the control group. The more regularly cucumber juice was consumed, the lower the blood pressure levels experienced by hypertensive patients.

Keywords: Blood Pressure, Cucumber Juice, Hypertension

1. BACKGROUND

Hypertension, or high blood pressure, is a condition characterized by increased blood pressure in the arteries and is a leading cause of death worldwide. Known as the silent killer, hypertension often has no specific symptoms but can lead to serious complications such as heart disease, stroke, and kidney failure of Health of the Republic of Indonesia [1]. According to the World Health Organization (WHO), approximately 1.13 billion people worldwide suffer from hypertension, and this condition is responsible for 9.4 million deaths annually. These high morbidity and mortality rates make hypertension a top global health priority requiring comprehensive management [2].

One of the main public health concerns in Indonesia is the alarmingly high prevalence of hypertension. This rate continues to rise, especially among the elderly and productive age groups, according to statistics from the Basic Health Research (Riskesmas). Specifically, Central Lombok Regency has the second-highest prevalence of hypertension in West Nusa Tenggara (NTB) Province [3].

Two main types of risk factors contributing to the high prevalence of hypertension are modifiable and non-modifiable factors. Gender, age, and heredity (genetics) are unmodifiable risk factors. Meanwhile, unhealthy diets, including excessive fat and salt consumption, obesity, lack of exercise, smoking, and stress, are all modifiable factors that act as significant triggers [4]. With age, the elasticity of the

arteries decreases, leading to increased vascular resistance and ultimately raising blood pressure. Therefore, lifestyle changes play a crucial role in preventing and managing hypertension [5].

High blood pressure management encompasses two main strategies: pharmacological and non-pharmacological approaches. The pharmacological approach itself is based on the administration of antihypertensive medications according to a medical professional's prescription [6]. Long-term dependence on medication can cause side effects and significant costs. As a complement, non-pharmacological therapies that focus on lifestyle changes and the use of natural ingredients offer a safer, more affordable, and more accessible alternative for the general public [7].

Among various natural ingredients, cucumber (*Cucumis sativus* Linn.) has great potential to be used as a complementary therapy for people with high blood pressure [8]. Cucumbers are known to contain beneficial nutrients, especially potassium, magnesium, and water. Potassium plays an important role in balancing sodium levels in the body, magnesium helps relax blood vessel walls, while its high water content provides a natural diuretic effect. This combination synergistically helps lower blood pressure [9].

2. RESEARCH METHODS

The research methodology was quantitative, quasi-experimental, pretest-posttest, and control group. This approach was chosen to assess the effectiveness of the intervention by comparing the results of the two groups before and after treatment. The study population consisted of 217 hypertensive patients registered in the Tanak Beak Community Health Center (Puskesmas) area. A sample of 68 respondents was selected from

this population using a purposive sampling technique

Patients with high blood pressure (>140/90 mmHg), willingness to participate in the trial, age 18 years and over, and not taking antihypertensive medication met the study inclusion requirements. Hypertensive patients who experienced serious side effects such as kidney failure, heart disease, or stroke, were allergic to or disliked cucumbers, or who withdrew from the trial during its duration were excluded from the study [10].

The selected sample was then divided into two groups, with 34 respondents in the intervention group and 34 in the control group. For three consecutive days, the intervention group was given 100 milliliters of fresh cucumber juice twice daily, in the morning and evening. Meanwhile, the control group received no intervention and continued their normal routine. This was done to ensure that the treatment was indeed responsible for any changes in the intervention group.

Respondents' blood pressure was measured both before and after the intervention (pretest and posttest) to obtain data. A stethoscope and a manual sphygmomanometer were used as measurement tools, and the results were recorded on an observation sheet. Statistical analysis was performed on the collected data. Because the Kolmogorov-Smirnov normality test indicated that the data were not normally distributed, the non-parametric Wilcoxon Signed Rank Test was used to compare paired data (pretest and posttest) at a significance level of $\alpha = 0.05$ [11]

3. RESULTS AND DISCUSSION

Table 1.

Pretest–Posttest Blood Pressure of the Intervention Group (n=34)

Category	Pretest (%)	Posttest (%)
Normal	0 (0,0%)	6 (17,6%)
Prehypertension	3 (8,8%)	9 (26,5%)
Mild Hypertension	10 (29,4%)	11 (32,4%)
Moderate Hypertension	13 (38,2%)	6 (17,6%)
Severe Hypertension	8 (23,5%)	2 (5,9%)
Total	34 (100%)	34 (100%)

Based on Table 1, before the intervention, the majority of respondents were in the moderate hypertension (38.2%) and severe hypertension (23.5%). After the intervention, normal blood pressure (17.6%) and prehypertension (26.5%), moderate hypertension (17.6%) and severe hypertension (5.9%) were included.

Table 2.

Pretest–Posttest Blood Pressure of Control Group (n=34)

Category	Pretest (%)	Posttest (%)
Normal	0 (0,0%)	0 (0,0%)
Prehypertension	2 (5,9%)	2 (5,9%)
Mild Hypertension	8 (23,5%)	8 (23,5%)
Moderate Hypertension	14 (41,2%)	13 (38,2%)
Severe Hypertension	10 (29,4%)	11 (32,4%)
Total	34 (100%)	34 (100%)

Table 2: Before the intervention, respondents were in the moderate hypertension (41.2%) and severe hypertension (29.4%). After the intervention, respondents in both categories were almost equal, namely moderate hypertension (38.2%) and severe hypertension (32.4%).

Table 3.

Results of the Wilcoxon Blood Pressure Test for the Intervention Group

Variabel	Pretest Median (Min–Max)	Posttest Median (Min–Max)	Selisih Median	p-value
Systolic	160 (140–180)	144 (130–160)	–16	0,001
Diastolic	96 (85–110)	88 (75–100)	–8	0,001

Based on Table 3 After cucumber juice intervention, both systolic and diastolic blood pressure decreased significantly.

Table 4.

Results of the Wilcoxon Blood Pressure Test for the Control Group

Variabel	Pretest Median (Min–Max)	Posttest Median (Min–Max)	Selisih Median	p-value
Systolic	156 (140–175)	156 (138–174)	0	0,291
Diastolic	95 (85–108)	95 (85–107)	0	0,781

Based on Table 4, no significant changes were observed in the control group ($p > 0.05$), which indicates that the cucumber juice intervention was the cause of the decrease in blood pressure in the intervention group.

Table 5.

Tabulation of Decrease in Systolic and Diastolic Blood Pressure

Blood Pressure	Category	Intervention Group n (%)	Control Group n (%)
Systolic	There is a decrease	34 (100%)	16 (47,1%)
	No decrease	0 (0%)	18 (52,9%)
Diastolic	There is a decrease	34 (100%)	13 (38,2%)
	No decrease	0 (0%)	21 (61,8%)

Based on the cross-tabulation in Table 6, all respondents (100%) in the intervention group experienced a decrease in systolic and diastolic blood pressure after consuming cucumber juice. In contrast, in the control group, the decrease in blood pressure was much lower and inconsistent, with only 47.1% experiencing a decrease in systolic blood pressure and 38.2% experiencing a decrease in diastolic blood pressure. This clear difference strengthens the evidence that the cucumber juice intervention is consistently effective in lowering blood pressure.

There was a shift in blood pressure categories in the intervention group. Before the intervention, the majority of respondents were in the moderate hypertension (38.2%) and severe hypertension (23.5%). After the intervention, there was an increase in the number of respondents with normal blood pressure (17.6%) and prehypertension (26.5%), and a decrease in the moderate hypertension category to 17.6% and severe hypertension to 5.9%.

Normal, prehypertension, stage 1 hypertension, and stage 2 hypertension are the classifications of hypertension according to the ESH-ESC (2020). A systolic pressure of 140–159 mmHg or a diastolic pressure of 90–99 mmHg

indicates stage 1 hypertension, while a systolic pressure of 160–179 mmHg or a diastolic pressure of 100–109 mmHg indicates stage 2 hypertension. This finding is supported by research findings, which indicate that the majority of respondents did indeed have stage 1 or 2 hypertension.

This study aligns with Handayani's (2019) study, which reported that the majority of hypertension patients at the Community Health Center (Puskesmas) were in the stage 1 and 2 categories. Similarly, Sari (2020) found that most hypertension sufferers in rural areas were in the moderate to severe category. Furthermore, residents in the Tanak Beak Community Health Center's work area have a habit of consuming salty and fatty foods, which increases the risk of hypertension. Low socioeconomic factors also contribute to a lack of awareness of healthy lifestyles.

Thus, the distribution of blood pressure before the intervention demonstrates the importance of intervention efforts to lower respondents' blood pressure. This underpins the need to administer cucumber juice as a form of non-pharmacological therapy.

The distribution of blood pressure in the control group before the study showed that the majority of respondents were in the moderate hypertension category (41.2%), followed by severe hypertension (29.4%), mild hypertension (23.5%), and only 5.9% of respondents were in the prehypertension category. No respondents were in the normal category. After the study period without intervention, the blood pressure distribution experienced only slight changes, with respondents with moderate hypertension decreasing to 38.2%, while severe hypertension increased to 32.4%. The prehypertension and mild hypertension categories remained the same as the baseline, and no respondents reached the normal category.

These changes indicate that the control group did not experience significant improvement in blood pressure distribution; in fact, there was a trend toward an increase in cases of severe hypertension. This confirms that without intervention or specific control efforts, blood pressure in hypertensive patients tends to remain high and is at risk of worsening. This phenomenon aligns with the theory that hypertension is a chronic disease with complex pathophysiological mechanisms, making it difficult to control without structured management through both pharmacological and non-pharmacological treatments.

The results of this study align with those of Rahajeng and Tuminah (2009), which showed that without lifestyle interventions or therapy, the prevalence of hypertension in the community remains high and tends to increase with age. A similar study by Wulandari et al. (2020) also found that in the control group, blood pressure distribution did not change significantly after the observation period, indicating the need for concrete action to lower blood pressure.

Furthermore, the distribution results in the control group in this study also showed that severe hypertension tended to increase after the study period. This can be influenced by various uncontrolled external factors, such as a high-salt diet, lack of physical activity, stress levels, and poor adherence to medication. According to PERKI (2021), lifestyle factors such as a high-sodium diet, smoking, and emotional stress play a significant role in worsening hypertension if behavior modification is not implemented.

The stagnant or even worsening blood pressure distribution in the control group demonstrates the importance of health interventions as part of hypertension management. Without health education, dietary adjustments, or natural interventions

such as cucumber juice, people with hypertension are likely to remain in the same condition or worsen. This provides a strong basis for comparison to demonstrate the effectiveness of the cucumber juice intervention in the treatment group in this study.

After consuming cucumber juice for three days, the Wilcoxon Signed Rank Test results in the intervention group showed a significant decrease in blood pressure. After starting at 160 mmHg, the median systolic blood pressure dropped to 144 mmHg, with a p-value of 0.001 ($p < 0.05$). Similarly, the median diastolic blood pressure dropped from 96 mmHg to 88 mmHg with a p-value of 0.001 ($p < 0.05$). This indicates that the pre-test and post-test results differ significantly, supporting the idea that drinking cucumber juice significantly lowers blood pressure in hypertensive patients.

The decrease in blood pressure in the intervention group can be explained by the physiological mechanisms of cucumber's nutritional content. The high potassium content in cucumbers can increase sodium excretion through urine (natriuresis), thereby reducing plasma volume and ultimately lowering blood pressure. Furthermore, potassium can also increase nitric oxide (NO) production, which causes vasodilation, resulting in smoother blood flow and reduced peripheral resistance [12].

The results of this study are consistent with Azizah (2021) study, which found a significant decrease in systolic and diastolic blood pressure after consuming cucumber juice in hypertensive patients [13]. Research by Dewi. (2021) also supports these results, where administering cucumber juice for several days to elderly hypertensive patients showed a significant decrease in blood pressure [14]. Putri (2020) study also reported similar results

in a different population. This demonstrates the consistent benefits of cucumber juice as a complementary therapy for hypertension [15].

The Wilcoxon test results in the control group showed no significant difference between pretest and posttest blood pressure. The median systolic blood pressure remained at 156 mmHg with a p-value of 0.273 ($p > 0.05$), while the median diastolic blood pressure also remained at 95 mmHg with a p-value of 0.367 ($p > 0.05$). This confirms that without the intervention of cucumber juice consumption, the respondents' blood pressure did not experience a significant decrease during the study period.

The findings of this study are consistent with those of Maharani (2024), who reported that the control group did not experience a significant decrease in blood pressure, while the intervention group receiving cucumber juice showed significantly different results. Thus, this study strengthens the evidence that blood pressure reduction can only be achieved through specific interventions, not through natural variation [16].

4. CONCLUSION

The results of the study showed a statistically significant decrease in the intervention group. In contrast, the control group that did not receive treatment did not show any statistically significant changes. Based on the Wilcoxon test, the intervention group showed a statistically significant change in blood pressure between before and after treatment ($p < 0.05$). In contrast, the control group did not experience a significant change ($p > 0.05$). The posttest comparison between the two groups also showed a significant difference, which proves that cucumber juice is effective in lowering blood pressure. Cross-tabulation data showed a significant contrast between the two groups. While all respondents

(100%) in the intervention group showed a decrease in systolic and diastolic blood pressure, the control group showed inconsistent results, with only 47.1% experiencing a decrease in systolic and 38.2% in diastolic. Therefore, it can be concluded that cucumber juice has efficacy as a non-pharmacological complementary therapy to lower blood pressure in hypertensive patients.

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