

# Cucumber Juice Treatment to the Decrease of Systolic and Diastolic Blood Pressure

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## ABSTRACT

**Background:** Hypertension is the increase of blood pressure >140/90 mm Hg. Hypertension can cause a stroke or heart failure that puts hypertension as the second biggest cause of death in Indonesia. Its serious complication demands the right treatment. Non-pharmacological treatment using cucumber can be one of the alternatives for hypertension treatment. This is because cucumber is an adequate diuresis.

**Aim:** The research is to know the effect of cucumber juice treatment in decreasing systolic and diastolic blood pressure of essential hypertension patients of the elderly in PSTW Budi Luhur Yogyakarta.

**Method:** This is a quasi-experiment study with a time-series design. The study subjects were the clients in Budi Luhur Elderly Home Care of Yogyakarta who suffered essential hypertension as many as ten patients using saturated sampling.

**Results:** The result of the analysis using the Wilcoxon Signed Rank Test showed the value of asymp. Sig. (2-tailed) 0,013 of systolic blood pressure and 0,000 of diastolic blood pressure with  $\alpha = 0,025$ .

**Conclusion:** The cucumber juice treatment decreases the systolic and diastolic blood pressure in essential hypertension elderly patients. More samples, controlling units, and better technology are suggested to get better results for further research.

**Keywords:** Essential Hypertension, Systolic blood pressure, Diastolic blood pressure, Elderly

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## INTRODUCTION

Hypertension is the main factor of cardiovascular disease, which causes the highest mortality in Indonesia [1]. According to the causes, hypertension has two classifications: essential or unidentified hypertension causes and secondary hypertension or identified hypertension cause [2]. According to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7), it is stated that someone experiences hypertension if the systolic blood pressure is more than 140 mm Hg and the diastolic blood pressure is more than 90 mm Hg [3]. The data result from the Report of Baseline Health Research 2007 mentioned that hypertension is the second cause of death (6.8%) after stroke (15.4%) in Indonesia [4]. The prevalence of hypertension in Indonesia is around 30% [5]. Based on WHO's data in 2000, 972 million people, or 26.4% of people on this earth, suffered from hypertension, and it is estimated that the number is increasing by 29.2% in 2025 [6]. Hypertension can happen to anyone, and a higher age brings a higher risk of hypertension [7]. The aging process causes the high risk of the elderly to suffer from hypertension. The aging process can cause changes in body function and structure. One of the aging process which causes hypertension risk increase is aging in the cardiovascular system [8].

The increasing number of hypertension patients in the elderly needs to be decreased by reducing hypertension patients' efforts. The efforts made by the government to handle the problem are by holding elderly health centers. The elderly health center has some activities such as blood pressure examination, medication for hypertension patients, and hypertension counseling. This effort is expected to decrease the number of hypertension in the elderly [9]. There are two types of hypertension medication, namely pharmacological and nonpharmacological

medication. There are various pharmacological medications to decrease blood pressure [10]. Pharmacological medication suggested by JNC 7 is diuretics, beta-blockers, calcium channel blockers or calcium antagonists, angiotensin-converting enzyme inhibitors, and angiotensin II receptor blockers [11]. Nonpharmacological medication can be done by changing lifestyle such as decreasing overweight, limiting sodium intake, inclining aerobic active cities, maintaining calcium, calcium, and adequate magnesium intake, and stopping from smoking [12]. The research result revealed that the intake of sodium, calcium, calcium, and magnesium is related to hypertension [13]. Thus, the Dietary Approaches' targets to Stop Hypertension (DASH) of hypertension patients are 2.300 mg sodium, 4.700 mg calcium, 500 mg magnesium, and 1.250 mg calcium [14]. To fulfill the DASH of hypertension patient diet, nutrition intake addition is needed to fulfill the DASH requirement. Nutrition addition can use vegetable juice. One of the vegetables containing high calcium and low sodium is cucumber, and thus, cucumber is good for hypertension patients [15]. Referring to the problems mentioned before, the research analyzes the effect of cucumber juice intake on systolic and diastolic blood pressure decrease in hypertension patients.

## METHOD

The research was a quasi-experiment with a time series design [16]. The population of the research was patients at Budi Luhur elderly home of Yogyakarta experiencing essential hypertension. After screening tests covering  $\geq 60$  years old patients of all sex and experiencing essential hypertension of stadium I, the population was acquired. From the population, samples taken were taken using a saturation sampling technique and obtained ten people. The variables of respondents' characteristics were age, sex, education, and Body Mass Index (BMI). The distorter

variables were anti-hypertension medicines, stress, smoking, salt consumption, obesity, alcohol, and other diseases. The data were taken using interviews and observation. The respondents were given cucumber juice therapy as many as two times in the morning and the afternoon for 6 hours and were done in 7 days. Each cucumber juice intake was as many as 210 grams. Every time before and after the intervention, the blood pressure was measured. After the intervention, the blood pressure measurement was taken 2 hours, and the difference of systolic and diastolic blood pressure average level before and after the intervention was also monitored. To examine the significance level of average difference of systolic and diastolic blood pressure before and after the intervention, Wilcoxon signed-rank test with  $\alpha = 0,025$  was done. However, a normality test was done beforehand by using the Kolmogorov-Smirnov test to reveal data distribution.

## RESULTS AND DISCUSSION

- General description of Budi Luhur elderly home of Yogyakarta:** Budi Luhur, the elderly home of Yogyakarta, is located in Setanan, Bangunjiwo, Kasihan, Bantul. It has eight areas with 61 occupants; 18 males (29.51%) and 43 females (70.49%). The occupants' health condition data reveals that 29 people have a history of hypertension; 8 males (27.59%) and 21 females (72.91%).
- Characteristics of Respondents:** The research was done in 2010 with ten respondents, and there were no respondents who were excluded during the research in Budi Luhur elderly home of Yogyakarta. The respondents' characteristics, namely age, sex, education, and BMI, can be seen in Table 1 below.

Table 1. Respondents' Characteristics with Cucumber Juice Intervention at Budi Luhur Elderly Home of Yogyakarta.

Variable	Treatment group	
	(n) 10	%
Respondent characteristics		
1. age		
65-70	4	40
71-75	1	10
76-80	3	30
81-85	2	20
2. Gender		
Male	4	40
Female	6	60
3. Education		
No school	7	70
Elementary School	2	20
Junior high school	0	0
Senior High School	1	10
4. Body Mass Index		
Minus	2	20
Normal	8	80
Excess	0	0
Total	10	100

- The effect of cucumber juice intake on systolic and diastolic blood pressure:** Table 2. The average systolic and diastolic blood pressure before and after the intervention
- Result Of Wilcoxon Signed-Rank Test:** Wilcoxon signed-rank test was used to investigate the effect of

cucumber juice intake on systolic and diastolic blood pressure before and after intervention with  $\alpha = 0,025$ . The result of the Wilcoxon signed-rank test can be seen in table 3.

Measurement results	Pre Test (mm Hg)	Post Test (mm Hg)
Systolic Blood Pressure	145.43	143.29
Diastolic Blood Pressure	90.57	83.71

Table 3. Result Of Wilcoxon Signed-Rank Test

	TDSPOS-TDSPRE	TDSPOS-TDSPRE
Asymp.Sig (2-tailed)	.013	.000

## DISCUSSION

The research was done in Budi Luhur elderly home of Yogyakarta for one week and revealed that the respondents suffering from hypertension were mostly in the age of 65 – 7- years old, namely 40%, and the fewest number of hypertension was in the age of 71 – 75 years old namely 10%. Based on Donlon's theory, it is mentioned that older age brings a higher risk of hypertension. This is because of the aging process in the cardiovascular system [17]. In the research, it does not mean that the research result was not in line with the theory but because it is based on the respondents' age distribution which was more in the age of 65 – 70 years old and thus, respondents suffering from hypertension were mostly in the age of 65 – 70 years old compared to 71 – 75 years old elderly. The research result revealed that female respondents were more (60%) than male respondents (40%). This is because the elderly in Budi Luhur elderly home of Yogyakarta has more female occupants, namely 70.49%, than male occupants, namely 29.51%. Besides, the result of medical record data at Budi Luhur elderly home of Yogyakarta showed that elderly suffering from hypertension were mostly females, namely 72.41% and only 27.59% were males. This is in line with the theory that after the menopausal period, females have a more significant risk of hypertension than males. This is related to the estrogen hormone declining in females, connected to atherosclerosis as one of hypertension causal factors (Stanley, 2007a). This is supported by the United States' statistical data in 2008 mentioning that hypertension patients were mostly females, namely 25.9% compared to males, namely 24% [18].

The research result revealed that most respondents did not pass education, namely 70%, and the smallest number of education was Senior High School graduates, namely 10%. This fact is in line with the theory mentioning that someone's learning process or learning experience determines one's behavior. Thus, generally, someone with higher education level has different behavior from those with a lower educational level. As a result, educational level affects someone's disease control and management. Incorrect disease management can increase morbidity [19]. The fact is following statistical data in the United States in 2008 showing that 36.1% of people with lower education than senior high school suffered from hypertension, and 21.2% of people with a bachelor's degree or other higher education suffered from hypertension [20]. The BMI measurement result in the research revealed that most respondents had normal BMI, namely 80%. 20% of them had less BMI, and there were no respondents with over

BMI. The facts are the opposite of the theory saying that one of the hypertension risk factors is obesity. Thus, it can be assumed that hypertension cause is an aging process, especially in the cardiovascular system. The aging process in the cardiovascular system causes artery blood vessels to become stiff and crooked. Besides, there is also thickening and protrusion formation in the heart valves that can cause hypertension [21].

**The effect of cucumber juice intake on systolic and diastolic blood pressure in hypertension patients:** The research was done by giving cucumber juice for one week followed by blood pressure measurement. It was obtained that the average systolic blood pressure before the measurement was 145.43 mm Hg and 143.29 mm Hg after measurement. Before the intervention, the diastolic blood pressure was 90.57 mm Hg, and it was 83.71 mm Hg after the intervention. Besides the average systolic and diastolic blood pressure measurement before and after the intervention, the average blood pressure difference was also obtained. The average result of systolic blood pressure decrease was 2.14 mm Hg, and the average diastolic blood pressure decrease was 6.86 mm Hg. The result showed that the intervention by giving cucumber juice could decrease both systolic and diastolic blood pressure.

Data analysis using statistical tests was done to investigate the further significance of cucumber juice in decreasing systolic and diastolic blood pressure of hypertension patients. The data normality test using Kolmogorov-Smirnov showed that the data distribution was abnormal, and thus, the statistical test was continued by using Wilcoxon signed-rank test. The result of Wilcoxon signed-rank test between systolic blood pressure before and after intervention obtained asym. Sig (2 tailed) value of 0.013, while the diastolic blood pressure before and after intervention obtained asym. Sig (2-tailed) of 0.000 with  $\alpha = 0,025$ . The result showed that  $H_0$  was refused and  $H_a$  was accepted both in systolic and diastolic blood pressure, meaning that cucumber juice affects systolic and diastolic blood pressure decrease in respondents. Based on the above description, it can be concluded that cucumber juice affects systolic and diastolic blood pressure decrease in hypertension patients. This is in line with the theory mentioning that cucumber is an alternative to hypertension prevention and medication [22]. Cucumber can decrease systolic and diastolic blood pressure because cucumber contains high calcium and water [23]. Calcium content in cucumber is 122 mg, and the water content is 97.9 grams for every 100 grams of cucumber [24]. Calcium is an electrolyte function as the intracell fluid controller to prevent fluid buildup and sodium in cells, increasing blood pressure [25]. Calcium also has the function of vasodilatation in blood vessels. Vasodilatation in blood vessels can decrease the purifier barrier and increase the heat pump so that blood pressure can run normally. Besides, calcium can also limit renin release to change renin-angiotensin system activities. Besides, calcium can also affect the purifier and central nerve system, affecting blood pressure to control blood pressure [26]. Thus, a high calcium level in cucumber is a crucial component in decreasing blood pressure.

Water content in cucumber is also high, namely 97.9 gram per 100 gram of cucumber, and becomes an

essential component in decreasing blood pressure. This is due to the benefit of water as a solvent and brings wastes of body metabolism process, and thus, calcium and sodium excessive amount can be released through urine. The process keeps blood pressure average [27]. The previous study by Munaroh, Bambang, and Kuntoro entitled "The Effect of Starfruit and Cucumber Juice on Systolic and Diastolic Blood Pressure of Hypertension Patients" in 2007 showed the different result. The difference is in the systolic blood pressure. There is no difference in systolic blood pressure in the intervention and control group in their research, while the research revealed decreased systolic blood pressure. This is because the research used lower cucumber content, namely 30%, than starfruit, namely 70% in 1 glass of juice [28]. Thus, the effect is different compared to cucumber juice alone. However, in the research by Munaroh, Bambang and Kuntoro, there was a difference in diastolic blood pressure decrease in the intervention and control group [28]. This is in line with the research revealing that there is a decrease in diastolic blood pressure. This concludes that cucumber juice affects the decrease of systolic and diastolic blood pressure of hypertension patients in the elderly.

## CONCLUSION

According to the research in Budi Luhur elderly home of Yogyakarta in 2010, it can be concluded that the data analysis result of systolic blood pressure before and after intervention using Wilcoxon signed-rank test obtained asym. Sig (2-tailed) of 0.013 with  $\alpha = 0.025$ . This means that cucumber juice has an effect on the systolic blood pressure decrease of elderly with hypertension. The data analysis result of diastolic blood pressure before and after intervention using Wilcoxon signed-rank test obtained asym. sig (2-tailed) of 0.000 with  $\alpha = 0.025$ . This means that there is an effect of cucumber juice on diastolic blood pressure decrease of elderly with hypertension. There is an effect of cucumber juice on systolic and diastolic blood pressure decrease of elderly with essential hypertension.

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