

The Effectiveness of Cucumber Suri Juice (*Cucumis Sativus*) On Blood Pressure in Menopausal Hypertension

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ABSTRACT

Hypertension is a crucial health problem. Complications of hypertension make damage to the target organs and increase the cardiovascular morbidity and mortality. Cucumber suri juice is an alternative non-pharmacological therapy for menopausal women with hypertension because it has potassium content.

This study was conducted to examine the effectiveness of cucumber suri juice (*Cucumis Sativus*) on blood pressure in hypertensive menopausal women.

The study was a quasi-experimental pretest-posttest with control group design. It was 20 respondents selected by purposive sampling, divided into two groups there were intervention group (10 respondent) and control group (10 respondent). Data were analyzed used paired T test.

The results showed that the decrease systolic blood pressure in the intervention group was 31,30 mmHg and diastolic blood pressure 16,60 mmHg (p value 0,000) and in the control group decreased systolic blood pressure by 2,0 mmHg and diastolic blood pressure 1.3 mmHg (p value > 0.05).

There was a significant effect of cucumber suri juice on blood pressure in the intervention group. Therefore that the cucumber suri juice can be an alternative treatment among menopausal women with hypertension.

Keywords: Cucumber Suri (*Cucumis Sativus*), Menopause, Hypertension, Blood Pressure

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BACKGROUND

Hypertension is a crucial health problem in almost every country, as one of the triggers factors for the emergence of deadly Non Communicable Disease (World Health Organization, 2015). Complications caused by hypertension in general are damage to target organs in the heart, brain, chronic kidneys, peripheral arteries and retinopathy. The damage to target organ, especially in the heart and blood vessels, can worsen the prognosis of people with hypertension, thereby increasing the morbidity and mortality of cardiovascular disease (Christopher T. Lee, Gordon H. William, 2011).

Increased blood pressure caused 7.5 million deaths from total deaths, contributing to disability of 3.7% in the worldwide as well contributing to the inability of 57 million sufferers to reach life expectancy. *World Health Organization*(WHO) mentions the prevalence of hypertension in the world today around 1.13 billion people. This number is estimated in 2025 of 1.15 billion people from all the world's population (World Health Organization, 2019) (World Health Organization, 2016) (Endang Triyanto, 2014).

Hypertension effect more women than men, in 2015 1 in 5 women had hypertension (Endang Triyanto, 2014) (Mills et al., 2016). The impact in women by 14.3%, and the cause of death 1 in 5 women in the world (Abramson & Melvin, 2014). The percentage of hypertension in perimenopausal women (45-54 years) was 27% and in China the increase in blood pressure in pre menopausal women was 29.7% (Whelton et al., 2018) (Zhou et al., 2015). In Indonesia hypertensive women at the age of 45 until 54 years by 45,3%, at the age range is the average women entering menopause (Kementrian Kesehatan RI, 2018). The cases in Central Java reach 15.84%. The women who experience hypertension in Jepara numbered 13,467 people (Dinas Kesehatan Provinsi Jawa Tengah , 2018).

Postmenopausal women have a risk of suffering from hypertension by 2.7 times greater than non-menopausal women. Increasing age in women increases the risk of cardiovascular diseases including hypertension (Zhou et al., 2015). Research in Iran reported that the increase in systolic blood pressure in menopausal women was higher 16%, compared to non-menopausal women 2.8% with p value 0.001 (Mahdavian & Abbassian, 2014).

Management of pharmacological hypertension use anti-hypertensive drugs, such as those from the Angiotensin-converting enzyme (ACE-inhibitor) such as captopril 12.5-150 mg/day (Williams et al., 2018). However, pharmacological therapy often causes side effects in sufferers. A study in Turkey reported that administration of ACE-inhibitor class to 164 hypertensive patients caused cough side effects in 50 patients (p value <0.001) (Yılmaz, 2019). The results of a systematic review stated that the administration of captopril in hypertensive patients was associated with cough events and increased the risk of coughing by 76.2 times (Zhou et al., 2015). Furthermore, research in Indonesia on the side effects of captopril administration reported that out of 100 hypertensive patients who received captopril therapy 87% experienced side effects, and 63% of them were women. The side effects that occur are 76% dry cough, 50% headache, 30% dry mouth, 12% constipation, 8% itchy spots and 6% taste disturbances (Diatmika, Artini, & Ernawati, 2018).

Non-pharmacological therapy can be used as an alternative therapy in hypertension includes fruits, vegetables, leaves and roots that contain high potassium, calcium and several other important substances. The advantage is has not harmful impact on the body and can boost immunity (Pereira, Velho, Cortez, Szerwieski, & Cortez, 2016) (Nisa, 2012). Several previous studies related to the provision of fruits and vegetables that contain high potassium for hypertensive patients are cucumbers, tomatoes and bananas with an average weight between 100 grams and 400 grams and a potassium content between 294 and 1432 mg, have been shown to be able to reduce systolic blood pressure by 12.5. mmHg to 19 mmHg and

diastolic blood pressure between 8.9 mmHg - 15 mmHg (Ahmad & Nurdin, 2019); (Sutria & Insani, 2013) (Hutasoit & Waliyo, 2019).

Cucumber suri is a fruit that contains high potassium, where at 100 grams of cucumber suri contains 1,008 milligrams of potassium (Hayati Ari, Lidiasari Eka, 2009). The potassium content in cucumber suri is much higher than in cucumbers, watermelons and bananas, so the hope is that it can produce a greater effect on lowering blood pressure in hypertensive menopausal women. Until now there has been no research on the effectiveness of giving cucumber suri juice to blood pressure, so there needs to be evidence to produce new innovations related to non-pharmacological alternative therapies to reduce blood pressure in hypertensive menopausal women.

METHODS

This research is a Quasi-Experimental pre-test and post-test with control group design. This research was conducted from February 2020 to March 2020. The population in this study were hypertensive menopausal women in the Public Health Center of Bangsri I Jepara. The research subjects in this study were menopausal women who met the inclusion and exclusion criteria. The inclusion criteria in this study included menopausal women aged 48-55 years, menopausal women with grade 1 hypertension (TDS: 140-159 mmHg, TDD: 90-99 mmHg), menopausal women taking antihypertensive drugs (captopril) and women. menopause who have a history of hypertension. The exclusion criteria in this study were menopausal women who have a history of heart disease, kidney disease and diabetes, menopausal women who smoke,

The research sample divided into intervention and control groups using lotrey technique. The sample in this study is 20 menopausal women with hypertension who were divided into two research groups, namely the intervention and control groups. The intervention group received 400 grams of suri cucumber juice and captopril, while the control group in this study was received the captopril drug and the duration of administration in this research was 7 days.

The main result of this study is the effect of cucumber suri (*Cucumis sativus*) juice in reducing systolic and diastolic blood pressure in menopausal women with hypertension. The measurement of blood pressure in this study was checked before and after intervention used sphygmomanometer digital. Analysis of research data includes homogeneity test, Independent T-test and paired T-test. This research was registered at the Research Ethics Commission of the Faculty of Medicine, Sultan Agung University Semarang with the Ethical Clearance number 036/1/2020 / Bioethics Commission, January 31, 2020.

RESULTS

1. Homogeneity Test of Respondent Characteristics by Age, Education Level and Profession.

Table 1. Homogeneity Test of Respondent Characteristics

Variable	Intervention Group		Control Group		p value *
	N	%	N	%	
Age					
48-51	9	90	7	70	0.104
52-55	1	10	3	30	

Education					
SD / MI	3	30	5	50	0.488
SMP / MTs	3	30	2	20	
SMA / SMK / MA	4	40	3	30	
Profession					
Housewife	8	80	7	70	0.921
Traders	1	10	3	30	
Entrepreneur	1	10	0	0	

* Levene Test

The results of statistical tests on age, education, occupation show that the p value is > 0.05 . This means that the research subjects in the two research groups do not have differences or are homogeneous, so that the possibility of bias from outside variables can be avoided.

2. Differences in systolic blood pressure in the Intervention and control groups

Table 2. Differences In Systolic Blood Pressure In The Intervention And Control Groups

Variable	Treatment Group	Control Group	p value *
	Mean \pm SD	Mean \pm SD	
Systolic Blood Pressure			
Pretest	151.30 \pm 5.37	148.60 \pm 5.91	0.314
Posttest	120.00 \pm 2.58	146.60 \pm 4.16	0,000
Delta (Δ)	31.30 \pm 3.80	2.00 \pm 3.30	0,000
P value **	0,000	0.088	

* Independent T-test

** Paired T-test

Statistical tests showed that there was no significant difference in systolic blood pressure before intervention in the two study groups (p value > 0.05), but after the intervention p value < 0.05 , this means that there was a significant difference in systolic blood pressure after intervention. The difference in the mean systolic blood pressure in the two study groups showed a significant difference (p value < 0.05).

Based on Paired t test results showed that in the intervention group there was a significant difference in systolic blood pressure between pretest and posttest (p value < 0.05), which means that administrations of suri cucumber juice 400 grams and captopril for 7 days had an effect on systolic blood pressure in menopausal women with hypertension. . In the control group there was no significant difference before and after being given captopril, this was based on p value > 0.05 . The decrease in systolic blood pressure in the treatment group was 31.30 mmHg, while in the control group it was 2.00 mmHg.

3. Differences in Diastolic Blood Pressure in the Treatment and Control Groups

Table 3. Differences in Diastolic Blood Pressure in the Intervention and Control Groups

Variable	Treatment Group	Control Group	p value *
	Mean \pm SD	Mean \pm SD	
Diastolic Blood Pressure			
Pretest	95.30 \pm 2.21	96.00 \pm 2.05	0.473
Posttest	78.70 \pm 3.26	94.00 \pm 3.12	0,000
Delta (Δ)	16,600 \pm 1.95	1.30 \pm 2.00	0,000
P value **	0,000	0.070	

* Independent T-test

** Paired T-test

Based on Table 3, it can be seen that the mean diastolic blood pressure in the two study groups before the intervention was not significantly different (p value > 0.05), but after the intervention there was a difference (p value < 0.05), as well as the difference. The mean also has a significant difference (p value < 0.05).

The paired t test results showed that there was a significant difference in diastolic blood pressure before and after treatment (p value < 0.05), in the control group there was no significant difference (p value > 0.05). The administration of cucumber juice and antihypertensive drugs for 7 days was effective in reducing diastolic blood pressure by 16.60 mmHg, while administration of antihypertensive drugs alone for 7 days was able to reduce diastolic blood pressure by 1.30 mmHg.

DISCUSSION

The finding of study showed that there was significant difference the effect of cucumber suri juice on blood pressure in menopausal hypertensive between the intervention and control group. The supplementation of suri cucumber juice with dose 400 grams for 7 days can reduce systolic and diastolic blood pressure in women with menopausal hypertension. The administration of cucumber suri juice with the antihypertensive drugs was able to reduce systolic blood pressure by 31.30 mmHg, and diastolic blood pressure by 16.60 mmHg. The decrease in systolic and diastolic blood pressure is greater in the intervention group than in the control group whose decrease in systolic blood pressure is 2.00 mmHg and diastolic 1.30 mmHg. The results in this study was related previous research was mentioned that giving 3 pieces of Ambon banana is equivalent to 400 grams, 3 times a day for 7 days can reduce systolic blood pressure by 19 mmHg, diastolic blood by 11 mmHg (Sutria & Insani, 2013).

The potassium content in cucumber suri is thought to play a role in reducing systolic and diastolic blood pressure in hypertensive menopausal women. The role of potassium in the body is to maintain the balance of acids and alkalis as well as normal cell structure and function (Sudoyo AW, Setyohadi B, Alwi I, Simadibrata M, 2014). The mechanism of potassium in lowering blood pressure is to reduce the secretion of the hormone aldosterone, thereby reducing sodium and water reabsorption in the kidneys. Other effects of potassium are reduced sodium and fluid retention, resulting in decreased plasma volume, cardiac output and peripheral retention. Another mechanism is by inhibiting renin secretion, thereby

inhibiting the conversion of angiotensin to angiotensin I and II which can cause vasodilation of blood vessels.(Majumder & Wu, 2014).

High potassium intake causes natriuresis and prevents sodium retention which can ultimately reduce lower blood pressure (Poorolajal et al., 2017). The National High Blood Pressure Education Coordinating Program (JNC 7) in 2003 recommended a potassium diet for the prevention and treatment of hypertension of >90 mmol/d or the equivalent of 3,500 mg/day. In 2006 the American Heart Association (AHA) recommended intake of potassium according to the DASH diet of 120 mmol/day or the equivalent of 4.7 grams/day. Furthermore, in 2010 the American Society of Hypertension (ASH) recommended the same amount of potassium diet as the recommended AHA of 120 mmol/d (Rabasseda, 2007).

Dietary Approaches to Stop Hypertension (DASH) states that high potassium intake can reduce oxidative stress in obese hypertensive patients and reduce blood pressure. However, please note that high potassium consumption should come from food sources and not from supplements (Williams et al., 2018). Potassium content in food sources is higher in fruits and vegetables than in cereals and meat (Houston, 2011).

The interdependence of potassium and sodium in hypertension pathogenesis showed that increasing potassium intake and limiting sodium consumption can be used as an effort to prevent and treat primary hypertension and complications of cardiovascular disease. The link based on a proved study that study subjects given a diet high in potassium and low in sodium have an effect on reducing blood pressure. Conversely, if the diet is high in sodium and low in potassium, it can cause an increase in blood pressure (Weber et al., 2014) (Qamar S and Shaikh A, 2018).

CONCLUSION

Based on the finding of this study, it could be concluded that there was a significant effect of cucumber suri (*Cucumis Sativus*) juice to increase on potassium levels and decrease systolic and diastolic blood pressure in menopausal hypertension. This study provides the insight of knowlagde that the cucumber suri juice can be alternative treatment among menopause women with hypertension. This study can be used as a reference for further research with a larger number of samples, cucumber suri preparation that can last a long time, control nutrient intake, especially sodium consumption.

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