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The Effect of Cucumber *Suri (Cucumis Sativus)* Extract on Blood Pressure of Mother's Postpartum Hypertension

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ABSTRACT

Background: Hypertension Postpartum is an increase in blood pressure 140/90 mmHg with or without proteinuria or edema. postpartum hypertension postpartum has been done by giving pharmacological therapy but it can cause side effects. Non-pharmacological therapy is currently often used as an alternative medicine or as a complementary therapy to minimize side effects hypertension maternal blood pressure postpartum.

Purposes: This study aimed to analyze the potential of a cucumber suri extract ((Cucumis Sativus) as an antihypertensive drug companion to help repair blood pressure in postpartum women with hypertension

Methods: Thistype of research is a True Experiment with pre and post test control group design through which 15 people in the intervention group were given cucumber extract 1x1 400 mg and nifedipine 10 mg and 15 people in the control group were given nifedipine 10 mg for 7 days.

Result: The systolic blood pressure of the intervention group decreased by 20.33 mmHg and the control group decreased by 9.86 mmHg with a p-value of 0.000 <0.05. Diastolic blood pressure in the intervention group decreased by 10.33 mmHg and the control group by 5.60 mmHg with a p-value of 0.001.

Cucumber suri extract has the potential as a complementary therapy to reduce blood pressure in postpartum hypertensive.

Keywords: Cucumber extract, Hypertension, Blood Pressure, Hypertension

INTRODUCTION

One indicator of the health of a population as a whole and a measure of the efficiency of the health care system is the Maternal Mortality Rate (MMR) [1]. Pregnancy hypertension is one of the causes of AKI. Hypertension is a cause of maternal and prenatal morbidity and mortality [2]. One third of women who experience gestational hypertension or pre-eclampsia will continue to experience increased blood pressure in the postpartum period even though at the start of labor the blood pressure is normal [3].

The cause of postpartum hypertension apart from being present during pregnancy, postpartum hypertension is also caused by the use of analgesic drugs such as ergometrine to treat postpartum bleeding problems, hypervolemia, namely the use of large volumes of fluid to treat inadequate anesthetic pain. Other causes are anxiety problems experienced by mothers after delivery and preeclampsia which is accompanied by symptoms of headaches, epigastric pain and even seizures [4 5]. The incidence of hypertension in pregnancy is around 5-10% of all pregnancies and is the second cause of maternal death [6].

According to the World Health Organization (WHO) every day around 810 women in the world die due to preventable diseases related to pregnancy and childbirth. the number of maternal deaths was 295,000 women during and after pregnancy and during childbirth in 2017 and 94% occurred in developing countries [7]. The Maternal Mortality Rate (MMR) in developing countries is caused by hypertension which ranks second, namely 14% after bleeding 27.1% [8]. Based on the Ministry of Health in 2020, the most common causes of maternal death in Indonesia were bleeding in 1,330 cases

(28.59%), hypertension in pregnancy 1,110 cases (23.86%), and infection in 216 cases (4.64%) [9]. Central Java Province has the third highest maternal mortality rate caused by hypertension in pregnancy among all provinces. The number of cases of maternal mortality in Central Java Province is 76.9 per 100,000 live births and most of the deaths occur during the puerperium of 64.18%. . At the time of pregnancy it was 25.72% and at the time of delivery it was 10.10% [10].

Mothers with postpartum hypertension can experience various complications, including brain hemorrhage, stroke, retinal injury, eye disorders, heart problems, pulmonary edema and liver necrosis. Other researchers also reported that complications for postpartum mothers with hypertension include kidney disorders, kidney failure, and damage to blood vessels [9]. Handling of postpartum hypertensive mothers aims to prevent complications through pharmacological and non-pharmacological treatment. Pharmacological treatment is carried out by administering antihypertensive chemical drugs including ACE inhibitors, Ca blockers, beta blockers, and diuretics [11]. Giving pharmacological therapy has been proven to have good effectiveness but has side effects in its use such as flatulence, constipation, nausea, coughing and headaches [12] . Non-pharmacological therapy has many advantages such as more affordable prices, easy to obtain and can minimize side effects [13].

Various studies regarding other non-pharmacological interventions on blood pressure such as research conducted by Ritonga (2017) by giving rosella infusion with a composition of 10 grams brewed with 200 ml of water once a day for 4 days (effect size = 0.324), Theresia Anita (2017) by giving 250 ml of tomato juice consumed once a day for 14 days (effect size = 0.243), and research conducted by Nur Alfi Fauziah (2018) by giving chayote extract 500 mg once a day for 11 days (effect size = 0.613) . These studies have not yielded the expected results because there was only a slight decrease in systolic and diastolic blood pressure [14], [15], [16].

One of the management of non-pharmacological therapy to reduce blood pressure is giving cucumber suri extract. Cucumber suri is a fruit that contains high potassium, in 100 grams of cucumber suri contains 1.008 milligrams of potassium. Potassium contained therein when compared to cucumbers, tomatoes and bananas is much higher in cucumber suri, so that it can be used as an alternative non-pharmacological therapy in hypertension. Therefore researchers are interested in conducting research on this fruit, the hope is that it will be able to have an effect on a greater reduction in blood pressure.

METHODS

This type of research is quantitative with a research design using a True experiment with randomized pretest and posttest control group design. The population is postpartum women with hypertension who are treated at Bhakti Wiratamtama Hospital Semarang and Bhayangkara Hospital Semarang.

The sample in the study was 30 people who were divided into 2 groups, namely the intervention and control groups. distribution of samples to each group by randomization process, by making 30 envelopes bearing 15 odd number envelopes and 15 even number envelopes. all envelopes were randomized, each subject who met the research criteria received one envelope chosen by the subject and opened by the enumerator.

In this study the intervention group was given cucumber suri (cucumis sativus) extract at a dose of 400 mg and 10 mg nifedipine for 7 days. the control group was given nifedipine 10 mg for 7 days. Blood pressure check using a digital tensimeter.

This research has been approved by the Health Research Ethics Committee of the Semarang Poltekkes Ministry of Health on February 14, 2022 with number: 088/EA/KEPK/2022. Researchers used informed consent to obtain availability to become subjects.

RESULTS

Respondent Characteristics

Table 1: Distribution of Respondent

Characteristics	Intervention Group Characteristics (n=15)		Control Group (n=15)		ρ- Value*
	N	%	N	%	
History of HDK					
Present	14	93.3	13	86.7	0.559
None	1	6.7	2	13.3	
Family History of Hypertension					
Present	8	53.3	9	60.0	0.724
None	7	46.7	6	40.0	
Stress level					
Normal	9	60.0	13	86.7	0.235
Mild	5	33.3	1	6.7	
Moderate	1	6.7	1	6.7	
Severe	0		0		

Very severe	0	0

*Homogeneity *Levene's*

After the homogeneity test was carried out, the p value, both history of hypertension in pregnancy, family history, and stress levels, showed a p value > 0.05, so it was said that the data from the intervention and control groups were the same or homogeneous.

Normality Test Blood Pressure

Table 2: Table of Normality Test Blood Pressure Normality

Variables	Intervention		Control	
	Systolic BP	Diastolic BP	Systolic BP	Diastolic BP
Pre	0,111	0,863	1,167	0,017
Post 1	0,111	0,513	0,688	0,256
Post 2	0,774	0,072	0,395	0,030
Post 3	0,940	0,080	0,672	0,287
Post 4	0,501	0,346	0,728	0,129
Post 5	0,967	0,210	0,695	0,316
Post 6	0,443	0,171	0,909	0,381
Post 7	0,228	0,081	0,642	0,013
Post	0,363	0,109	0,504	0,013

**Shapiro-Wilk*

Based on table 2 it can be seen that the data normality test for the variable systolic blood pressure intervention and control systolic has a sig value. > 0.05 then the data is said to be normally distributed. So the follow-up test used the Independent t-test to determine differences in systolic blood pressure between the intervention group and the control group.
The data normality test for the intervention diastolic blood pressure variable has a sig value. > 0.05, the data is said to be normally distributed and the control diastolic blood pressure has a sig value. < 0.05, the data is said to be not normally distributed. So the follow-up test uses the Mann-Whitney to determine the difference in diastolic blood pressure between the intervention group and the control group.

Analysis of different tests of systolic and diastolic blood pressure before and after in each group

Table 3: Analysis of different tests of systolic and diastolic blood pressure

Variables	Measurement		Group			
			Intervention		Control	
			Δ Mean	P value*	Δ Mean	P value*
Systolic	Pre	Post	20,33	0,000	9,867	0,004
	Pre	post 1	1,267	0,001	0,62	0,001
	post 1	post 2	3,533	0,030	1,13	1,000
	pos 2	post 3	2,267	0,001	1,37	0,001
	post 3	post 4	2,733	0,017	2,50	0,001
	post 4	post 5	2,533	0,040	2,06	0,001
	post 5	post 6	3,267	0.040	6,25	0,083
	post 6	post 7	1,733	0,001	2,00	0,045
Diastolic	Pre	Post	10,33	0,000	5,6	0,000
	Pre	post 1	1,857	0,001	0,600	0,010
	post 1	post 2	3,286	0,001	2,400	0,010
	pos 2	post 3	3,929	0,001	1,800	0,001
	post 3	post 4	0,643	0,001	1,933	0,100
	post 4	post 5	1,429	0,001	3,467	0,100
	post 5	post 6	0,857	0,001	1,000	0,100
	post 6	post 7	2,286	0,001	1,000	0,010

** Uji Post hoc bonferroni-Pairwise Comparisons*

Analysis using the *Anova Repeated Measure* continued *with Pairwi According*, the pretest and posttest systolic blood pressure intervention group showed a ρ value of 0.000 <0.05 and a P-value of 0.000 <0.05 in diastolic blood pressure, which means that there is a significant difference in the average reduction in systolic blood pressure each group between the pretest and posttest before and after treatment there is an effect. In the control group pre and post systolic and diastolic blood pressure showed a p value of 0.000 <0.05, which means there was an effect. What distinguished the reduction in systolic and diastolic blood pressure was seen from the mean deference, which was a greater decrease in blood pressure in the intervention group so that it could be concluded that administration of cucumber suri extract (Cucumis sativus) was effectively used as an alternative companion to hypertension drugs in postpartum women with hypertension.

Systolic and diastolic blood pressure before and after intervention in the intervention group and the control group

Table 4: Measurement of systolic and diastolic blood pressure before and after intervention in both groups

Variables		Group			
		Intervention		Control	
	Pre/Post	Mean±SD	Min-Max	Mean±SD	Min-Max
Systolic blood pressure	Pre	147,73±5,921	140-158	149,87±7,150	145-174
	Post 1	146,47±5,902	136-155	148,93±6,181	140-176
	Post 2	144,20±7,485	130-157	148,80±5,185	142-172
	Post 3	141,47±8,919	125-156	148,07±8,242	140-169
	Post 4	138,93±9,016	123-153	147,07±5,483	140-166
	Post 5	135,67±9,635	120-152	145.53±5,330	138-167
	Post 6	133,93±11,26	115-153	144,47±6,243	128-158
	Post 7	130,40±10,73	115-152	142,00±6,267	131-156
	Post	127,40±8,927	115-140	140,00±6,640	128-156
Diastolic blood pressure	Pre	95,00±2,536	90-99	102,33±3,638	98-110
	Post 1	93,80±2,596	90-98	100,53±4,421	93-109
	Post 2	92,40±2,848	88-97	99,20±6,405	85-109
	Post 3	91,20±6,405	87-96	91.33±2,748	91-107
	Post 4	93,80±2,596	85-96	100,53±4,421	93-108
	Post 5	91,16±5,578	84-95	93,33±7,480	91-109
	Post 6	86,00±6,866	82-93	92,33±7,286	90-108
	Post 7	84,66±4,608	76-90	91,33±8,957	82-100
	Post	84,67±5,444	75-89	96,73±2,742	85-100

Table 4 explains that of all systolic and diastolic blood pressure measurements in the intervention and control groups the mean value experienced for 7 days. The average systolic blood pressure measurement in the intervention group and the control group which was measured every day for 7 days can be seen in the graphic below:

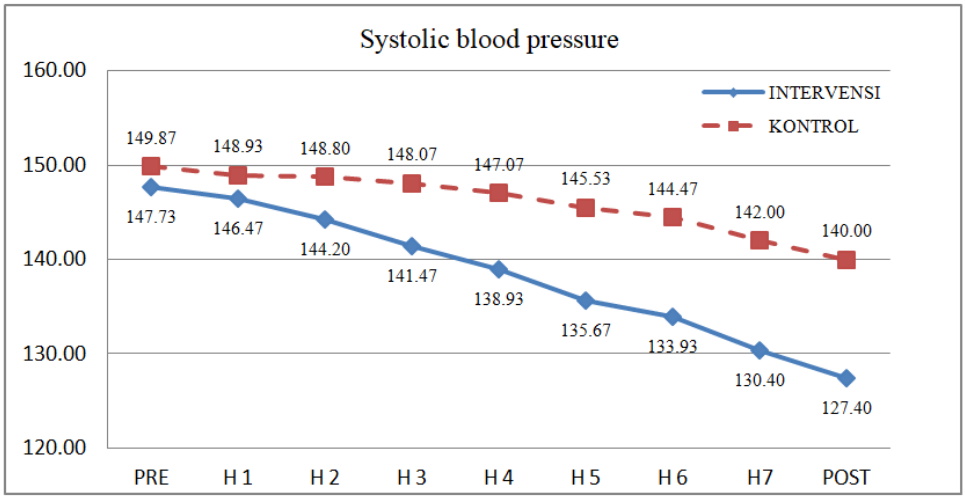

Fig 1: Changes in average systolic blood pressure in the intervention and control

Fig 1 above shows that the average change in systolic blood pressure on the first day to the 7th day for the intervention group and the control group both experienced a decrease in the average blood pressure value. It can also be seen graphically that the decrease in blood pressure in the intervention group is greater than the decrease in the average value of blood pressure in the control group.

The decrease in the average diastolic blood pressure measurement in the intervention group and the control group which were measured every day for 7 days can be seen in the graphic image below:

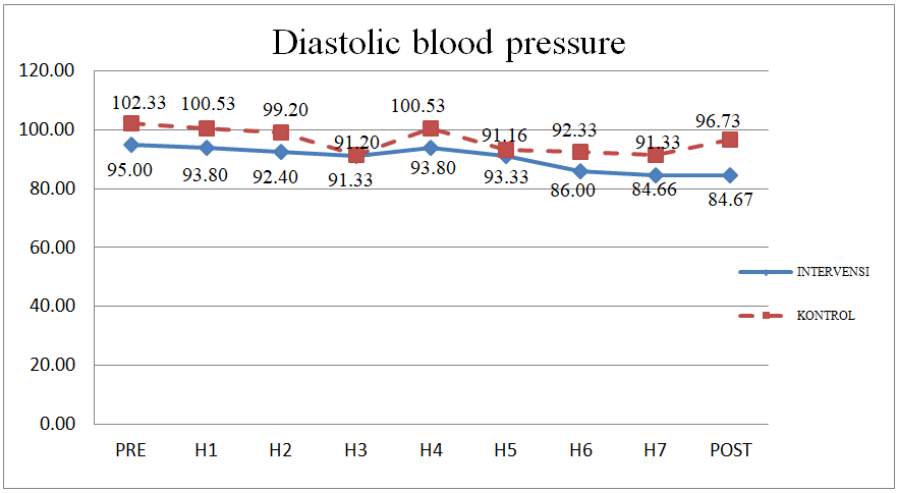

Fig 2: Changes in average diastolic blood pressure in the intervention and control groups

Analysis of differences in systolic blood pressure in the intervention group and the control group

Table 5: Analysis of differences in systolic blood pressure in the intervention group and the control group

Variables	Pre/Post	Intervention	Control	P-Value*
		Mean±SD	Mean±SD	
Sistolic Blood Pressure	Pre	147,73±5,921	149,87±7,150	0,381
	Post 1	146,47±5,902	148,93±6,181	0,273
	Post 2	144,20±7,485	148,80±5,185	0,060
	Post 3	141,47±8,919	148,07±8,242	0,071
	Post 4	138,93±9,016	147,07±5,483	0,060
	Post 5	135,67±9,635	145.53±5,330	0,001
	Post 6	133,93±11,26	144,47±6,243	0,002
	Post 7	130,40±10,73	142,00±6,267	0,001
	Post	127,40±8,927	140,00±6,640	0,000
	Δ Mean	20,33±9,867	10,463±6,479	0,000

**independent t test*

In the intervention group, the mean systolic blood pressure from pretest to posttest measurements decreased by 20.33mmHg, while in the control group, the mean systolic blood pressure results from pretest to posttest measurements decreased by 9.867mmHg. Between the intervention and control groups, the difference in systolic blood pressure reduction was 10.463 mmHg. It can be concluded that pharmacological therapy (POR) accompanied by cucumber suri extract has a higher potential than pharmacological therapy (POR) in reducing systolic blood pressure in postpartum hypertensive women.

Analysis of differences in diastolic blood pressure in the intervention group and the control group

Table 6: Differences in diastolic blood pressure between the intervention group and the control group

groups	Pre/Post	Intervention	control	P-Value*
		Mean±SD	Mean±SD	
Diastolic Blood Pressure	Pre	95,00±2,563	102,33±3,638	0,061
	Post 1	93,80±2,596	100,53±4,421	0,057
	Post 2	92,40±2,848	99,20±6,405	0,080
	Post 3	91,20±6,405	91,33±2,748	0,000
	Post 4	93,80±2,596	100,53±4,421	0,017
	Post 5	91,16±5,578	93,33±7,480	0,022
	Post 6	86,00±6,866	92,33±7,286	0,025
	Post 7	84,66±4,608	91,33±8,957	0,020
	Post	84,67±5,444	96,73±2,742	0,001
	ΔMean	10,33±6,405	5,6±4,222	0,001

**Man Whitney*

The diastolic blood pressure between groups showed that the p value <0.05 since the 3rd day of measurement, meaning that there was a difference in the decrease in the average diastolic blood pressure between the intervention group and the control group on the 3rd day. in the intervention group managed to reduce more with a decrease of 10.33 mmHg while in the control group managed to reduce diastolic blood pressure by 5.6 mmHg, the difference in the average change in diastolic blood pressure in the intervention and control groups was 4.73 mmHg.

DISCUSSIONS

The results of the analysis of differences in systolic and diastolic blood pressure before and after being given intervention in the intervention group used the post hoc Bonferroni-pairwise comparisons test for systolic and diastolic blood pressure p value 0.00 <0.005. Based on these data it was stated that there was a significant difference in systolic and diastolic blood pressure before and after being given the intervention and there was an effect of giving 400 mg of cucumber suri extract on changes in blood pressure of hypertensive women during the puerperium who were given antihypertensive drug therapy with an average systolic decrease after the intervention of 20, 33 mmHg and a diastolic decrease of 10.33 mmHg.

The results of the blood pressure analysis obtained were supported by research conducted by Reni Hariyanti in 2020 that there was a difference in the average systolic and diastolic blood pressure values before and after the intervention in respondents who were given 400 grams of cucumber juice for 7 days indicating that there was a difference in the average value systolic blood pressure of 16.90mmHg and diastolic blood pressure of 11.90mmHg. The results of the paired t test analysis obtained a ρ value of 0.001 <005 for both systolic and diastolic pressure, meaning that there was a significant difference in the values of systolic and diastolic blood pressure before and after being given the cucumber juice intervention [17].

The results of the analysis of differences in systolic and diastolic blood pressure before and after intervention were given to the control group using the parametric paired t-test with a p-value of 0.000 <0.05 for both systolic and diastolic blood pressure. These results stated that there were significant differences in systolic and diastolic blood pressure before and after intervention in the control group and there was an effect of antihypertensive drug therapy on changes in blood pressure in hypertensive women during the puerperium with an average decrease in systolic after intervention of 10.33 mmHg and diastolic of 5.60 mm Hg. Hypertension is a condition of a person showing systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg [18].

Blood pressure will be much higher in the postpartum period than antepartum and intrapartum. This is due to a combination of loss of pregnancy vasodilatation factors after delivery, mobilization of extracellular fluids after delivery and administration of non-steroidal anti-inflammatory agents for postdelivery analgesia. Oxidative stress also has an important role in the pathophysiology of hypertension, metabolic syndrome and atherosclerosis. Oxidative stress can cause endothelial dysfunction and hypertension through inactive stimulation of Nitric Oxide Synthase (NOS) mediated by Radical Oxygen Species (ROS)[19].

To reduce oxidative stress, antioxidants are needed which consist of compounds that reduce the negative impact of antioxidants through donating electrons to free radicals so that they become paired, and further oxidative damage can be inhibited and immediately stopped quickly. The content of flavanoids is a high source of antioxidant compounds, one of which is found in cucumber suri, which works to inhibit renin secretion so that angiotensin I cannot be converted to angiotensin II and activates Endhotelium Derived Relaxing Factor (EDRF) as a trigger for vasodilation and maintains Nitric Oxide. Synthase (NOS) as a potent vasodilator. Cucumber suri also contains potassium which works in 3 ways, namely as a diuresis, inhibiting the kidneys to secrete renin so that angiotensin II is not formed, and as a vasodilator [20].

CONCLUSION

Cucumber Suri extract (Cucumis sativus) at a dose of 400 mg for 7 days in hypertensive postpartum women who received nifedipine 10 mg/day had a significant effect on reducing

systolic and diastolic blood pressure. Knowledge insight that suri cucumber extract can be an alternative treatment among postpartum mothers with hypertension.

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