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EFFECT OF CUCUMBER (*CUCUMIS SATIVUS*) JUICE ON LOWERING BLOOD PRESSURE IN ELDERLY

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ABSTRACT

Background: Hypertension is one of the diseases that cause high morbidity. The use of modern hypertension medical treatment may cause a side effect, so cucumber as one of traditional medicines may come a choice.

Objective: This study aims to see the effect of cucumber (*Cucumis sativus*) juice on lowering blood pressure in elderly at working area of Puskesmas (public health center) of Abeli, Kendari, 2015.

Methods: This was a pre-experiment study with one group pretest-posttest design. Twenty elderly > 60 years old were selected by simple random sampling.

Results: The result showed that there was a significant effect of cucumber juice on lowering blood pressure in elderly people at working area of Puskesmas of Abeli, with *t test* for systolic blood pressure showed that $t_{count} > t_{table}$ ($7.095 > 2.093$) or P-value is $0.000 < 0.05$; and *t test* for diastolic blood pressure showed that $t_{count} > t_{table}$ ($6.190 > 2.093$) or P-value is $0.000 < 0.05$.

Conclusion: The significant effect of cucumber (*Cucumis sativus*) juice on lowering blood pressure in elderly suggested that health professional might need to have the cucumber to deal with hypertension. However, further study is needed to examine the effect.

Key words: Cucumber, hypertension, elderly

INTRODUCTION

Hypertension is a disease resulting in high morbidity. According to Basha, hypertension is a condition where a person experiences an increase in blood pressure above normal resulting in morbidity or mortality.¹ Meanwhile, according to Sustrani, et al, hypertension is disorders of the blood vessels resulting in the supply of

oxygen and nutrients carried by the blood is inhibited to tissues that need.² The prevalence of hypertension in Indonesia amounted to 26.5% in 2013, but were diagnosed by health personnel and / or a history of taking medication was only 9.5%. This indicates that the vast majority of cases remain undiagnosed in the community and yet unreached by health

care.³ Based on the Health profile of Department of Health of Southeast Sulawesi, the number of people with hypertension in 2014 was 12,099, and by 2015 as many as 16,291 cases.⁴ While according to Health department of Kendari, the prevalence of hypertension in 2013 was 10,504 (6.69%) cases, in 2014 as many as 13,016 (8.17%), and 2015 by 9,813 (6.54%) cases.⁵ In addition, hypertension is ranked 5th in the health center of Abeli and some of them were elderly.

These data show that the problem of hypertension in Southeast Sulawesi need attention and good handling considering the prevalence and consequences is arising quite high. Despite efforts to reduce the incidence of hypertension, but the tendency of people with hypertension might be increased, influenced by various factors such as age, sex, smoking habits, obesity, genetic factors, diet, alcohol, salt consumption, work and pregnancy.

To deal with that, modern hypertension medications have been used, but it is considered having side effects, therefore, cucumber (*Cucumis sativus* Linn) as one of the traditional medicines might become a choice. Cucumbers can lower blood pressure with no side effect. Cucumber has a mineral content, including potassium, magnesium, and phosphorus. Potassium increases the excretion of Na, lowers renin secretion, arteriolar vasodilatation, and lowers response to endogenous vasoconstrictor; while magnesium is a strong vasodilatation because it is lowering contractility of vascular smooth muscle.⁶

Additionally, cucumber is also a diuretic because it contains a lot of water which helps lower blood pressure.⁷ Therefore, this study aims to examine whether cucumber has an effect or not to lower blood pressure in elderly.

METHODS

Design

This study employed pre-experiment design with one group pretest-posttest.

Population and sample

Twenty elderly in the working area of Health Center of Abeli Kendari were selected using simple random sampling from September to November 2015. The Inclusion Criteria for sample in this study were: 1) Respondents who suffered from hypertension, 2) Having blood pressure above 140 mmHg (systolic) or above 90 mmHg (diastolic), 3) not currently using inhibitors of the enzyme conversion of angiotensin, 4) composmentis and able to communicate well, 5) Cooperative, 6) willing to be a subject of research. The Exclusion criteria¹⁹ for this study were: 1) having systole blood pressure below 140 mmHg and diastolic under 90 mmHg, 2) using angiotensin converting enzyme inhibitors 3) Failure to follow the full therapy.

Intervention

The composition of cucumber juice consisted of blended one fresh cucumber 100 gram and water 200cc. The juice was consumed for 7 days for two times per day, morning and evening. The researchers in this study ensured that all respondents had the same dosage of the cucumber juice.

Instrument

Mercury Sphygmomanometer was used to measure the blood pressure. Normal blood pressure if systolic ranged from 120-140 mmHg, and diastolic ranged from 80-90 mmHg; while hypertension occurred if blood pressure was more than 140/90 mmHg.⁸

Ethical consideration

Before collecting data, the researchs obtained the permission from the Health

Center of Abeli Kendari. Informed consent was performed to the respondents. They were explained about the objective of the study, the procedure, and the data collection process. They were also asked to sign informed consent form. The respondents could withdraw anytime they wanted from this study. Confidentiality was the most important thing to maintain for the respondents in this study.

16 Data analysis

Data were analyzed using univariate and bivariate analysis. To analyze the effect of cucumber juice on blood pressure, paired t test and Independent t test were used with $\alpha \leq 0.05$.

RESULTS

16 Characteristic of the respondents

Table 1 shows that the age of respondents were from 60 to ≥ 80 and majority of respondents aged 70 - 79 years old (45%). They were female (75%) and male (25%). Most of them had elementary school background (57%) although some of them had no educational background (25%). They worked as housewives (80%), and 20% of them got no jobs. In this study, the respondents mostly had hypertension for 1-2 years (45%), some of them had more than 2 years suffering from hypertension (35%), and 20% of them had 0-11 months hypertension.

Table 1. Distribution of the respondents

No	Age	n	%
1	60 – 69	5	25
2	70 – 79	9	45
3	≥ 80	6	30
Total		20	100
No	Sex	n	%
1	Male	5	25
2	Female	15	75
Total		20	100
No	Education	n	%
1	Elementary School	15	57
2	Not attended school	5	25
Total		20	100
No	Occupation	n	%
1	Housewives	16	80
2	No occupation	4	20
Total		20	100
No	Hypertension Duration	n	%
1	0 – 11 Months	4	20
2	1 – 2 Years	9	45
3	> 2 Years	7	35
Total		20	100

Blood pressure before and after treatment

Table 2 shows that before treatment, all of the respondents (100%) had systolic pressure above 140 mmHg, and 13 respondents (65%) had diastolic pressure

above 90 mmHg. After treatment, of 20 respondents, 7 respondents (35%) had systolic pressure ≤ 140 mmHg, and 15 respondents (75%) had diastolic pressure above ≤ 90 mmHg.

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Table 2. Pre Test and Post Test blood pressure

Pre Test Blood Pressure		Post Test Blood Pressure	
Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)
160	100	140	80
180	110	160	100
160	90	150	90
170	100	160	90
160	90	150	80
170	100	150	90
170	90	160	90
170	100	160	100
160	90	130	80
170	100	160	80
150	90	150	80
150	100	140	90
180	100	140	100
160	90	130	80
150	100	150	80
170	100	160	100
160	100	140	80
160	90	140	80
180	110	150	100
170	100	150	90

Effect of Cucumber (cucumis sativus) Juice on lowering blood pressure 10

Table 3 shows the results of the analysis of the effect of the juice of cucumber (Cucumis sativus) against a decrease in systolic and diastolic blood pressure showed that the standard deviation value of the systolic blood pressure before being given a cucumber juice was 9.459 with mean 165.00; while the standar deviation value after administration of cucumber (Cucumis sativus) in systolic blood pressure was 9.881 with mean 148.50. The value of T count was 7.095 and P value was 0.000.

Standard deviation of diastolic blood pressure before being given the juice of

cucumber (Cucumis sativus) was 6.387 with mean 97.50; and standard deviation of diastolic blood pressure after administration of cucumber (Cucumis sativus) was 8.335 with mean value 88. The value of T count was 6,190 and the P value was 0.000.

Results of T test using SPSS program version 20.0 showed that t count for systolic blood pressure was 7.095, and t table was 2,093 by using α of 0.05, which means that t count > t table (7.095 > 2.093) (P value 0.000 < α 0.05). It was indicated that there was a difference in systolic blood pressure after being given the juice of cucumber (Cucumis sativus) to the respondent.

Table 3. Effect of Cucumber (cucumis sativux) Juice on lowering blood pressure

	Systolic Blood Pressure					Diastolic Blood Pressure				
	N	SD	Mean	P Value	T Count	n	SD	Mean	P Value	T Count
Pre Test	20	9.459	165	0	7.095	20	6.387	97.5	0	6.19
Post Test	20	9.881	148.5			20	8.335	88		

While the results of the t count for diastolic blood pressure was 6,190 and t table was 2,093 by using α of 0.05 indicates that t count > t table (6,190 > 2,093) or (P value 0,000 < α 0.05). So there was a difference in diastolic blood pressure after being given the juice of cucumber (Cucumis sativus) to the respondent. It can be concluded that H_0 rejected, which means there is the significant effect of the juice of cucumber (Cucumis sativus) to the decrease in blood pressure in elderly.

DISCUSSION

Findings in this study revealed that the respondents having hypertension were majority aged 77.05 in average (61-98 year old). It is in line with Smeltzer & Bare (2010) who said that individu has hypertension in the age 50 years and above.⁹ Copstead and Jacgyelyn (2009) also said that hypertension is in line with the increase of age.¹⁰ However, hypertension can occur in any ages, but mostly in elderly because of the natural change on the heart condition, blood vessels and hormone.¹¹

The findings of this study also revealed that there was a significant effect of cucumber juice on lowering blood pressure. It is however in line with the previous studies,¹² which indicated that systolic blood pressure was decreased after consuming cucumber juice (600 gram) in normal women. Supported by Lebalado (2014) also revealed that cucumber juice consumed in two weeks can lower blood pressure.¹³ However, it is said that high

blood pressure can be lowered significantly if consuming vegetables and fruits.¹⁴

Khomsan said that cucumber has hypotensive effect in lowering blood pressure and diuretic effect that decreases the amount of fluid that circulates in the bloodstream, which may ultimately reduce the heart's workload.¹⁵ This could be said that the workings of therapy with cucumber juice consumption is similar with anti-hypertensive diuretic drugs in lowering blood pressure.

In addition, cucumber contains calcium, magnesium, potassium and fiber. This is according to DASH diet stating that high calcium, magnesium,¹⁶ potassium,¹⁷ and fiber¹⁸ consumption as contained in vegetable has been proved to decrease systolic and diastolic blood pressure by 5.5 mmHg and 3 mmHg.¹⁹

The influence of the content of cucumber on blood pressure is clearly seen in the role of potassium, calcium, and magnesium to pump potassium - sodium. Potassium plays a role in maintaining the stability of the body through the electrolyte potassium-sodium pump. Lack of potassium in the blood will interfere with potassium-sodium ratio so that the levels of sodium will increase. This can lead to deposition of calcium in the joints and spine that increase the water content of the body, thereby increasing the workload of the heart and clotting of sodium in the blood vessels. As a result, the vessel wall can be eroded and chipped that eventually block blood flow, and increasing the risk

of hypertension with cucumber juice so it will likely be mitigated. While magnesium plays a role in activating the sodium-potassium pump, which pumps sodium out and potassium into the cell.²⁰

Magnesium also plays a role in maintaining heart rhythm in order to remain in normal conditions, improving blood flow to the heart, increasing the beneficial HDL cholesterol, and bringing a calming effect to the body. Magnesium also has an activity or work the same way but without the side effects of antihypertensive drugs class of calcium antagonists such as diltiazem, verapamil and Isoptin.¹⁴ This however will be able to maintain blood pressure remained orderly and stable. It can be concluded that consuming cucumber helps maintain and keep balancing of potassium-sodium pump that affect blood pressure. Several studies have found that patients with hypertension were given potassium intake of 2.5 grams per day can reduce systolic blood pressure by 12 mmHg and diastolic by 7 mmHg.²¹

Most respondents in this study also stated that they felt calm after consuming cucumber juice, and some of them stated that their headache and muscle tension on their nape feel lighter, even so, cease to exist. Thereby, we could conclude that cucumber is proven to have influence in lowering blood pressure.

LIMITATION OF THIS STUDY

The design of this study might have the limitation in term of the confounding variables that might affect the intervention. Therefore, further study is needed to examine the intervention with pre-post test with control group to enhance validity of the study

CONCLUSION

The result of this study showed a significant effect of cucumber (*cucumis sativus*) juice on the decrease of blood pressure in elderly

at the working area of Health center of Abeli Kendari. Therefore, health workers might need to promote the benefit of having cucumber juice to deal with hypertension in elderly with low price and affordable and without side effects.

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