

# The Effect of Giving Avocado Leaf Boiled Water on Lowering Blood Pressure in the Elderly with Hypertension in the Work Area Gambut Health Center

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## ABSTRACT

**Background:** Hypertension is a condition of a person's blood pressure being at a level above normal, hypertension treatment can be done herbally using avocado leaves. Avocado leaves can lower blood pressure because they contain active substances, namely flavonoids and quercetin. This research was conducted in the working area of the Tilango Health Center.

**Objective:** This study aims to determine the effect of giving boiled water of avocado leaves on reducing blood pressure in the elderly with hypertension.

**Methods:** This study design used a two-group quasi-experimental pre-test and post-test design. The sample is the elderly who have hypertension, amounting to 125 people with purposive sampling technique.

The research instrument used a questionnaire.

**Results:** Statistical test using T-test on blood pressure before and after the intervention was given a significance value of 0.000 (P-value<0.05).

**Conclusion:** This study concludes that there is a significant effect between giving avocado leaf boiled water on reducing blood pressure in the elderly with hypertension in the working area of the Tilango Health Center.

**Keywords:** Hypertension, Avocado leaves, Blood pressure, Elder patients

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## INTRODUCTION

Elderly (elderly) is the age of 60 years and over, the elderly is not a disease, but is the next stage of a life process marked by a decrease in the body's ability to adapt to environmental stress. Elderly is a condition characterized by a person's failure to maintain balance against physiological stress conditions, this failure is related to a decrease in the ability to live and an increase in individual agreement (Efendi F and Makhfudli M, 2009). The World Health Organization (WHO) categorized elderly as a group of population aged 60 years or above. Globally in 2013 the proportion of the population aged over 60 years was 11.7% of the total world population and it is estimated that this number will continue to increase along with the increase in life expectancy.

WHO data shows that in 2000 the life expectancy of people in the world was 66 years, in 2012 it rose to 70 years and in 2013 it became 71 years. The proportion of elderly people in Indonesia also increases every year. WHO data in 2009 showed that the elderly amounted to 7.49% of the total population, in 2011 it became 7.69% and in 2013 the proportion of elderly people was 8.1% of the total population (WHO, 2015).

The results of the Indonesian Ministry of Health's Basic Health Research, showed that the national prevalence of hypertension reached 31.7%, from 33 provinces in Indonesia there were 8 provinces where cases of hypertension patients exceeded the national average, namely: South Sulawesi (27%), West Sumatra (27%)., West Java (26%), East Java (25%), North Sumatra (24%), South Sumatra (24%), Riau (23%), and East Kalimantan (22%). Meanwhile, in a comparison of cities in Indonesia, hypertension cases tend to be high in urban areas such as: Jabodetabek, Medan, Bandung, Surabaya, and Makassar which reached 30%-34%, in Malang, hypertension sufferers in 2015 were 38.626 people and in Ngantang 30%.

Based on data from the Indonesian Ministry of Health, cases of hypertension in Gorontalo Province from 2012 were 15,333 cases, in 2013 decreased by 14,634 cases and increased again in 2014 as many as 14,915 cases. The highest cases were in Gorontalo Re-

gency, as many as 5,053 cases in 2017 at the age of 60 years and over (Ministry of Health, Gorontalo Regency, 2018). Multi-stakeholder efforts in controlling hypertension were confirmed through the signing of collaboration between the Ministry of Health of the Republic of Indonesia, Novartis, and the Center for Economic Studies and Health Policy at the University of Indonesia (FKM UI) to implement the Public Health Intervention Program. The Directorate of Non-Communicable Diseases invites people to be "SMART" by conducting regular health checks, getting rid of cigarette smoke and other air pollution, being diligent in physical activity, having a healthy diet, getting enough rest, and controlling stress (Ministry of Health, 2015).

Cases of hypertension in the community by 76% do not know that they suffer from hypertension. There is no difference in prevalence between men and women but the prevalence continues to increase by age: 5% aged 20-39 years, 26% aged 40-59 years, and 59.6% for age 60 years and over. From the results of measuring blood pressure at the age of 18 years and over, it was found that the prevalence of hypertension in Indonesia was 31.7%, where only 7.2% of the population already knew they had hypertension and only 0.4% of cases took hypertension medication.

Continuous high blood pressure causes the heart to work extra hard which in this condition causes damage to blood vessels, kidneys and eyes. Hypertension is also a common cause of stroke and heart attack. High blood pressure that does not get treatment regularly and routinely will bring the patient into serious cases and even cause death.

Complications of blood vessels caused by hypertension can cause coronary heart disease, heart infarction (blockage of blood vessels that cause tissue damage), stroke, kidney failure and high mortality. From the explanation above, it can be seen that hypertension has a negative impact on the body's organs and can even lead to death. Hypertension often attacks people with old age, this is caused by the degenerative process of body cells so that the work of the organs is no longer optimal and diseases appear in the elderly. Efforts have been made by health workers to treat hyper-

tension, namely non-pharmacological management, by living a healthy lifestyle. In patients with grade 1 hypertension, without other cardiovascular risk factors, a healthy lifestyle strategy is the initial stage of treatment, which must be followed for at least 4-6 months. If after this time period, the expected reduction in blood pressure is not found or other cardiovascular risk factors are found, it is strongly recommended to start pharmacological therapy. Healing and medical treatment are certainly an option for the wider community, but some people also try to treat hypertension with alternative routes.

One of them is herbal treatment, namely treatment using avocado leaves. The avocado plant, of course, is well known by the public, it's just that people only know the fruit. Its use is only limited to juices or mixtures, drinks. Whereas in addition to avocado leaves are useful for health. Avocado leaves contain polyphenols, quercetin, sugar alcohol persist which can be used for the treatment of hypertension.

The difference in efficacy for avocado flesh and avocado leaves is that the flesh can reduce pain, treat canker sores, prevent hardening of the arteries, improve blood circulation and prevent urinary tract infections, nausea in early pregnancy, help the development of the fetal brain and spine, stimulate formation of collagen tissue, maintaining healthy skin, blackening hair, and as a facial cooler (mask). While avocado leaves are usually used to treat nerve pain, stomach pain, lowering high blood pressure, treating kidney stones, headaches, stomachaches, sore throats, and bleeding. In addition to the fruit and leaves, avocado seeds can also be used to reduce blood sugar levels, treat toothache and diabetes.

Avocado leaves act as a diuretic because avocado leaves are believed to increase the volume of urine that is produced when urinating. The effect of increasing the volume of urine is to reduce blood pressure and kidney stone problems. Diuretics are recognized as a powerful way to treat hypertension and kidney stones recommended by WHO in 2003 and Japan Nuclear Cycle Development Institute (JNC) VII. Avocado leaf extract is useful for increasing urine output. The dose is 100 mg avocado leaf extract/kg body weight. This leaf can also be used as a laxative and antibacterial (*Staphylococcus* Sp, *Pseudomonas* Sp, *Escherichia* Sp).

Based on Ramadi's research conducted on people with hypertension it showed that there was a decrease in blood pressure after being given avocado leaf steeping therapy for 1 week in the Padang Pasir Padang Health Center Work Area. The first respondent was a smoker who experienced a decrease in blood pressure from 170/100 mmHg to 160/90 mmHg, meaning there was a decrease in systole by 10 mmHg and diastolic by 10 mmHg. While the second respondent who was not a smoker experienced a decrease from 180/110 mmHg to 165/90 mmHg, meaning that there was a decrease in systole by 15 mmHg and diastolic by 10 mmHg. The effects felt by respondents during therapy were more frequent urination and more urine.

Based on a preliminary study at the Tilango Health Center, from the recap of the number of elderly people who are active in the elderly posyandu at the Tilango Health Center as many as 222 people and as many as 130 elderly people have hypertension. The reason for the large number of elderly people with hypertension at the Tilango Health Center is caused by lifestyle and diet. Most of the elderly in Tilango rarely exercise and the food consumed contains a lot of oil and coconut milk. Even some of them often consume caffeine. From the description above, the researcher is interested in conducting research on "the effect of giving boiled water with avocado leaves on reducing blood pressure in the elderly with hypertension in the Tilango Health Center Work Area". The difference in research conducted by Ramadi A, is there is a difference in the effect of steeping avocado leaves on blood pressure in hypertension.

While the results of the researchers entitled the effect of giving boiled avocado leaves on the blood pressure of hypertensive patients at the Tilango Health Center stated that there was a significant effect in the administra-

tion of avocado leaf boiled water therapy on decreasing systolic and diastolic blood pressure and controlled diastolic blood pressure. And when pretest and posttest indicated failure of diet or control of hypertension and diastolic blood pressure, then the mean increase in systolic and diastolic blood pressure in the group was considered as a significant difference between the pretest and posttest data. This shows that there is an effect on hypertension, which is probably because avocado leaves contain polyphenols, quercetin and sugar alcohol persist. If the viscosity of the blood increases, the burden on the heart to pump it becomes heavy so that blood pressure will increase. This study aims to determine the effect of giving avocado leaf boiled water on reducing blood pressure in the elderly with hypertension.

**MATERIALS AND METHODS**

The research design used in this study was a two-group quasi-experiment pre-test and post-test design. To determine the effect of giving avocado leaf decoction on reducing blood pressure with hypertension in the elderly, by comparing blood pressure before being given avocado leaf decoction and after being given avocado leaf decoction with a control group that was not given any intervention (Sugiyono PD, 2018). The types of variables used are independent variables and dependent variables. The independent variable (independent) is the variable that affects or is the cause of the change, while the dependent variable is the variable that is influenced or becomes the result of the independent variable (Sugiyono PD, 2018). In this study, the independent variable (independent) was avocado leaf stew, and the dependent variable (dependent) was a decrease in blood pressure in the elderly. The population in this study was the elderly who suffered from hypertension in the working area of the Tilango Health Center, Gorontalo Regency, amounting to 222 people. The sample in this study used purposive sampling, which is a sampling technique by selecting a sample among the population as desired by the researcher, so that the sample can represent the previously recognized population characteristics.

**RESULTS**

**Univariate analysis**

The results of the study shown in *Table 1*, from the results shown, it is known that the blood pressure of the elderly before being given the avocado leaf stew was in the 1<sup>st</sup> degree hypertension of 11 respondents and the 2<sup>nd</sup> degree hypertension of 17 respondents. Then after being given boiled warm water for a week with the rule of drinking once a day, the respondent's blood pressure became normal for 8 respondents, 15 respondents had prehypertension and 15 respondents had hypertension degree.

**Table 1: Analysis of the elderly's blood pressure before and after the intervention**

Intervention group blood pressure			
Pre-test	n%	Post-test	n%
Normal (12/80 mmHg)	0 (0)	Normal (12/80 mmHg)	8 (28.6)
Pre hypertension (130/80 mmHg)	0 (0)	Pre hypertension 130/85 mmHg)	15 (53.6)
Grade 1 hypertension (140/90 mmHg)	11 (39.3)	Grade 1 hypertension (140/90 mmHg)	5 (17.9)
Grade 2 hypertension (160/100 mmHg)	17 (60.7)	Grade 2 hypertension (160/100 mmHg)	0 (0)
Total	28 (50%)		28 (50%)

The results of the study which are shown in *Table 2*, explains that 8 re-

spondents showed hypertension degree 1 and 20 respondents showed hypertension degree 2 while measuring the pre-test blood pressure in the control group. In the post test measurement, 11 respondents showed hypertension grade 1 and 17 respondents showed hypertension grade 2.

**Table 2: Analysis of the control group's elderly blood pressure on measurements (Pre and post-test)**

Intervention group blood pressure			
Pre-test	n%	Post-test	n%
Normal (12/80 mmHg)	0 (0)	Normal (12/80 mmHg)	0 (0)
Pre hypertension (130/80 mmHg)	0 (0)	Pre hypertension 130/85 mmHg)	0 (0)
Grade 1 hypertension (140/90 mmHg)	8 (28.6)	Grade 1 hypertension (140/90)	11 (39.3)
Grade 2 hypertension (160/100 mmHg)	20 (71.4)	Grade 2 hypertension (160/100 mmHg)	17 (60.7)
Total	28 (50%)		28 (50%)

**Bivariate analysis**

The results of the study, which are shown in Table 3, based on statistical tests carried out with the Paired Sample T Test, found the results of a decrease in the average blood pressure of the elderly between before and after being given avocado leaf steeping, which was 3.63 to 1.87. It is also known that the value of T count=13.772>T test=1.701, and obtained a significant effect between decreasing blood pressure in the elderly by giving avocado leaf steeping with the P-value of 0.000 (<0.05). It can be concluded that there is an effect between giving avocado leaf boiled water and blood pressure in the elderly in the intervention group.

**Table 3: Differences in pre-test and post-test elderly blood pressure in the intervention group**

Measurement				
Blood pressure	Normal (12/80 mmHg)	Pre hypertension (130/80 mmHg)	Grade 1 hypertension (140/90 mmHg)	Grade 2 hypertension (160/100 mmHg)
Pre-test (%)	0 (0)	0 (0)	8 (26.6)	17 (60.7)
Post-test (%)	8 (28.6)	15 (53,6)	5 (17.9)	0 (0)
mean	3.63-1.87			
Standard deviation	0.659			
T	13.772			
P-value	0			

The results of the study, which are shown in Table 4, are based on statistical tests carried out using the Paired Sample T-test. It was found that the average (mean) blood pressure of the elderly in the pre-test measurement was 3.71 and the post-test was 3.61. It is also known that the value of T count=1.000-0.05 so that H<sub>0</sub> is accepted. It can be concluded that there is no effect between pre-test and post-test blood pressure in the elderly in the control group.

**Table 4: Differences in pre-test and post-test elderly blood pressure in the control group**

Measurement				
Blood pressure	Normal (12/80 mmHg)	Pre hypertension (130/80 mmHg)	Grade 1 hypertension (140/90 mmHg)	Grade 2 hypertension (160/100 mmHg)
Pre-test (%)	0 (0)	0 (0)	8 (28.6)	20 (671.4)
Post-test (%)	0 (0)	0 (0)	11 (39.3)	17 (60.7)
mean	3.71-3.61			
Standard deviation	0.567			
T	1.000			
P-value	0.326			

The results of the study are shown in Table 5. From the results of statistical tests using the Wilcoxon Test, it was found that there was a difference in the decrease in blood pressure of the elderly between the intervention group and the control group, with the average value of the decrease in the intervention group being 2.00 which was greater than the control group 1.07 and the standard deviation value in the control group is 0.262 which is greater than the intervention group is 0.000. It is also known that the Z value=-5.099 and the P-value of 0.000 (<0.05) so that there is a significant difference between the blood reduction of the intervention group and the control group and the effect of steeping avocado leaves on reducing blood pressure in the elderly with hypertension is also known.

**Table 5: Differences in the blood pressure of the elderly in the intervention group and the control group in the working area of the Peat Health Center 2022**

Group	After intervention		Mean difference	Z	P-value
	mean	Standard deviation			
Intervention	2	0	0.93	-5.099	0
Control	1.07	0.262			

**DISCUSSION**

Based on data analysis using the T test, it was found that P-value=0.000<0.050 so H<sub>a</sub> was accepted, which means that there is an effect of steeping avocado leaves on blood pressure in the elderly with hypertension in the working area of the Tilango Health Center. It was found that the blood pressure of the elderly before being given boiled avocado leaf water was at hypertension degree 1 by 12 respondents and hypertension degree 2 by 19 respondents. Then after being given boiled warm water for a week with the rule of drinking once a day, the respondent's blood pressure became normal by 8 respondents, prehypertension 16 respondents and hypertension grade 1 as many as 5 respondents.

In this study, researchers used respondents with the overall gender of women. The selection of samples was done from elderly women because women have a higher risk of suffering from certain diseases due to degenerative processes. This is in accordance with the results of research obtained by Rohma NA, in his research he found that 80% of female respondents had hypertension more than men.

The theory of Mauhammadun AS, also says that postmenopausal women have a greater risk of experiencing hypertension than men. In general, the purpose of giving avocado leaf decoction therapy is to reduce high blood pressure where avocado leaves contain polyphenols, quercetin and sugar alcohol persist. Polyphenols act as antioxidants that can reduce the risk of

heart and blood vessel disease, quercetin acts as an anti-inflammatory by inhibiting the activity of both the production and release of allergic histamine or inflammatory mediators, sugar alcohol persist is a diuretic. Diuretics lower limbic pressure and deplete body sodium stores, diuretics lower blood pressure by decreasing blood volume and cardiac output, vascular and peripheral resistance. Diuresis will decrease plasma volume and stroke volume which will decrease cardiac output which ultimately lowers blood pressure (Dwijayanti A, *et al.*, 2015).

This shows that blood pressure is reduced after administration of avocado therapy. Moreover, the administration is given routinely, so hypertension was under control daily. According to Lianti R, steeping avocado leaves (*Persea americana* mill) can lower blood pressure because of the active substances, namely flavonoids and quercetin. The content of flavonoids is useful for preventing the occurrence of osteoporosis, is able to improve the function and anatomy of arterial blood vessels, and stabilize atherosclerotic plaques thereby lowering blood pressure. The content of quercetin helps relax the muscles of the arteries and helps normalize the narrowing of the arteries so that blood pressure decreases.

However, there are many factors that can cause uncontrolled hypertension even if someone drinks avocado leaf stew on a regular basis for example obesity, lack of exercise, smoking behavior, excessive salt consumption and stress. The content of avocado leaves can lower blood pressure by lowering blood viscosity so that the blood pressure of respondents who were given avocado leaf decoction therapy decreased blood pressure (Okta Y, 2020).

But if this therapy is not in accordance with the right dose, it is likely that its effectiveness will also not be proven because if everything is not right, the results will not be optimal. The decrease in hypertension is due to the presence of flavonoids in avocado leaves which acts as a diuretic by excreting the body fluids through urine so that the volume of body fluids decreases which slows down the heart's pumping power and reduction in blood pressure occurs. The results showed that the majority of respondents were with elementary and junior high school education (low), as many as 80.4%. The theory says that a person's learning process or learning experience determines the shape of a person's behavior. So that people with higher education are certainly different in behavior with those with low education. Notoatmodjo S said that a person's level of education affects a person's ability to receive information and manage it before it becomes good or bad behavior so that it has an impact on his health status. With a relatively low education, the elderly tend to be indifferent to their health such as irregular eating patterns, consumption of foods that should be avoided by people with hypertension and lack of awareness to do physical activity for body fitness.

This is in line with research conducted by Ramadi A, proving that there is a difference in the effect of steeping avocado leaves (*Persea americana* mill) on blood pressure in hypertensive patients. The results of a study showed the effect of giving boiled avocado leaves on blood pressure of hypertensive patients in Banguntapan, Bantul stated that there was a significant effect in administering avocado leaf boiled water therapy on decreasing systolic and diastolic blood pressure and controlled diastolic blood pressure, it was known that there was an increase in blood pressure. systolic and diastolic blood pressure and at the pretest and posttest indicating failure of diet or hypertension control and the mean diastolic blood pressure increase, the mean decrease in systolic and diastolic blood pressure in the group, there was a significant difference between the systolic and diastolic posttest data. This shows that there is an effect or benefit on reducing hypertension, which is probably because avocado leaves contain polyphenols, quercetin and sugar alcohol persist. If the viscosity of the blood increases, the burden on the heart to pump it becomes heavy so that blood pressure will increase. Based on data analysis using the T test, P-value=0.326>0.050 so that  $H_0$  is accepted, which means that there is no significant effect on decreasing blood pressure in the elderly with hypertension in the control group in the

working area of the Tilango Health Center. It was found that the blood pressure of the control group respondents in the pre-test measurement, namely hypertension grade 1 as many as 8 respondents and hypertension grade 2 as many as 20 respondents. Then on the post-test measurement, namely hypertension degree 1 as many as 11 respondents and hypertension degree 2 as many as 17 respondents.

The results showed that blood pressure for each measurement starting from day 1 to day 7 measurements only revolved around hypertension grade 1 and hypertension grade 2. There was no reduction to prehypertension and normal in the control group. Blood pressure is a condition where the pressure imposed by the blood on the arteries when blood is pumped by the heart throughout the body and limbs (Saputra M, *et al.*, 2019).

A person is said to have high blood pressure if his systolic blood pressure is above 140 mmHg and his diastolic is above 90 mmHg. Hypertension occurs due to rise in human blood pressure which itself is defined as the pressure that occurs in the human arteries when blood is pumped by the heart throughout the body. The instrument for measuring blood pressure is called a sphygmomanometer. The numbers shown by this measuring instrument are usually in two categories, namely the systolic and diastolic (pressure) numbers. For example, someone who has a blood pressure of 120/180 mmHg, the number 120 shows the blood pressure in the arteries when the heart contracts (systole), while the number 80 shows blood pressure when the heart is relaxed (diastole).

The results of the respondents' pretest mean blood pressure levels measured using a sphygmomanometer showed that hypertension was grade 1 with a systolic limit of 140-159 mmHg, and a diastolic blood pressure of 90-99 mmHg, while hypertension was grade 2 with a systolic limit of 160-179 mmHg, and a blood pressure of 160-179 mmHg, Diastolic blood pressure is 100-109 mmHg. The high blood pressure measurement results are thought to be due to the similar habits of some respondents, such as the habit of consuming fatty and salty foods that trigger hypertension. Other factors that can influence the occurrence of hypertension are gender, age, lifestyle, physical activity and so on. The mean age of hypertensive patients is >60 years. The older a person gets, the metabolism of calcium is disturbed and it can settle in the blood vessel, which causes arteriosclerosis and also reduces the elasticity of the arteries so that it can lead to hypertension.

Hypertension can be influenced by age, diet such as eating lots of fatty and salty foods, lifestyle such as lack of physical activity or rarely exercising, and the habit of consuming caffeine. Other factors that can increase blood pressure are coffee consumption and smoking. Foods that contain lots of fat will result in the accumulation of fat and cholesterol in the blood vessels, so that the arteries lose their flexibility and become stiff (arteriosclerosis). Heart, is forced to pump blood through blood vessels that are narrower than usual and results in increased blood pressure or hypertension (Saputra M, *et al.*, 2019).

In *Table 4* it can be seen that most of the respondents who became the research sample did not work so that there was a lack of physical activity carried out every day. Lack of physical activity is the cause that may cause the elderly to experience hypertension. Through regular exercise (aerobic physical activity for 30-45 minutes per day) can reduce peripheral resistance which will lower blood pressure.

Blood pressure can be influenced by factors that cannot be controlled and factors that can be controlled. Factors that cannot be controlled include heredity, gender and age. While the factors that can be controlled include obesity, exercise, smoking behavior, alcohol consumption, excessive salt consumption and stress (Sansena MA, *et al.*, 2019). Research conducted in the working area of the Tilango Health Center for 1 week found that respondents who had hypertension were more than 60 years old. Based on the theory expressed by Mauhammadun AS, the older the age-the higher

the risk of hypertension, this is caused by the aging process in the cardiovascular system.

Hypertension is a disease that can affect anyone, young or old, rich or poor. Hypertension is one of the deadliest diseases in the world. If hypertension is not treated, complications will occur such as stroke, heart attack, heart failure, and kidney damage while causing serious damage to blood vessels and organs such as the heart, kidneys, eyes and brain. The relative risk of hypertension depends on the number and severity of avoidable and unavoidable risk factors. The unavoidable factors include genetics, age, gender, and ethnicity, while avoidable factors include stress, obesity, and nutrition (Saputra M, *et al.*, 2019).

Hypertension can cause weak blood vessels to rupture. If this happens to a blood vessel in the brain, there is bleeding in the brain which can result in death. Stroke can occur due to blockages of blood clots that do not flow smoothly in the narrowed vessels. Hypertension therapy is done by not only through pharmacological therapy but there are non-pharmacological therapies such as herbs or herbal medicine. According to Wahdah N in his research found that giving 200 grams of cucumber juice in 100 ml of water can reduce hypertension.

Treatment of hypertension is divided into 2 groups, namely, pharmacological and non-pharmacological treatment. In pharmacological treatments there are several classes of antihypertensive drugs, basically lowering blood by affecting the heart or blood vessels or both. In addition to pharmacological treatment, there is a non-pharmacological treatment for hypertension sufferers, namely herbal medicine (avocado leaves).

Ramadi A research in a preliminary study conducted on 2 people with hypertension in the Padang Pasir Padang Health Center Work Area showed that there was a decrease in blood pressure after being given avocado leaf steeping therapy for 1 week. The first respondent was a smoker who experienced a decrease in blood pressure from 170/100 mmHg to 160/90 mmHg, meaning there was a decrease in systole by 10 mmHg and diastolic by 10 mmHg. While the second respondent who was not a smoker experienced a decrease from 180/110 mmHg to 165/90 mmHg, meaning that there was a decrease in systole by 15 mmHg and diastolic by 10 mmHg. The effects felt by respondents during therapy were more frequent urination and more urine.

Avocado leaves contain flavonoids, flavonoids can improve blood circulation throughout the body and prevent blockages in blood vessels, flavonoids also function as diuretics in the process of removing body fluids through urine so that the volume of body fluids decreases which results in lighter heart pumping power so that blood pressure drops. Diuretics function in the process of removing body fluids through urine, so that the volume of body fluids decreases which results in lighter heart pumping power. In addition, the function of this diuretic drug is to reduce extra cellular volume, as well as shed plasma that causes the blood to become concentrated, such as sodium (table salt) and potassium (Petters D, 2006). Blood pressure in respondents was shown to have decreased after being

given infusion of avocado leaves. The decrease in hypertension is due to the presence of flavonoids in avocado leaves which acts as a diuretic by excreting the body fluids through urine so that the volume of body fluids decreases which slows down the heart's pumping power and reduction in blood pressure occurs. The Glomerular Filtration Rate (GFR) showed a significant increase after the administration of flavonoids. Small changes in glomerular filtration or tubular reabsorption can potentially cause relatively large changes in urinary excretion. A high GFR makes the kidneys able to get rid of waste products from the body quickly, besides that it can cause all body fluids to be filtered and processed by the kidneys all the time every day and are able to regulate the volume and composition of body fluids appropriately and quickly.

## CONCLUSION

Based on the results obtained, it is known that avocado leaves have properties to reduce blood pressure in the elderly with hypertension in the working area of the Tilango Health Center 2019. Avocado leaves will be efficacious if consumed in the right dose and routinely every day. Treatment with herbal medicines is also recommended to further minimize the side effects that occur when taking chemical drugs.

This study concludes that there is an effect between giving avocado leaf boiled water and blood pressure in the elderly intervention group in the working area of the Peat Health Center 2022.

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