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Effectiveness of Zack's Cocoter Avocado Juice against Blood Pressure on Old Age Hypertension Patients in Palembang

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Abstract*: Hypertension is a disorder of the blood vessels that cause the oxygen supply and nutrients carried by the blood is nutrients carried by the blood are inhibited until the body tissue in need. This study aims to determine the effect of avocado juice+young coconut water to elderly who suffer from hypertension in Palembang. This study using Systematic Random Sampling as a way to take the sample, each sample amounted to 30 people for treatment and 30 people for comparison. Then the treatment group given avocado juice+young coconut water and the comparison group got Marjan green syrup for 7 consecutive days. The results showed that there is effect of giving the avocado juice+young coconut water on the systolic blood pressure with p-value < (α) 0.05, but there is no effect of avocado juice+young coconut water on diastolic blood pressure. There is an effect of avocado juice+young coconut juice on decreasing systolic blood pressure.

***Index Terms*: Hypertension, avocado juice + young coconut water, old age.**

I. INTRODUCTION

Hypertension or high blood pressure is an increase in systolic blood of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg at two measurements with an interval of five minutes in a state of rest/calm [1]. According to Gray et al. [2] that with increasing age, blood pressure will increase, because in the elderly there will be changes in blood vessels that can cause hypertension. In 2013, Riskesdas [3] reported that the prevalence of hypertension in Indonesia was 25.8% at the age of ≥ 18 years. In addition, Health department of South Sumatra Provincial reported that the prevalence of hypertension at age ≥ 18 years was 26.1%. Hypertension is a major risk factor for cardiovascular disease (especially stroke, angina, myocardial infarction, heart failure and left ventricular failure), kidney disease and retinopathy. Many hypertension supporting factors such as: obesity, insulin resistance, diabetes mellitus, low levels of physical activity, psychosocial stress, excessive salt intake, and excessive alcohol consumption. In addition, especially if in the form of central adiposity and if routine is done or occasionally monum but much more directly, and aging [4].

Steps that can be taken in applying the diet to hypertensive patients reduce salt intake and high fat. In addition, increasing fruit and vegetable consumption is needed. The main goal of regulating a hypertensive diet is to regulate healthy foods that can control high blood pressure. Broadly speaking, there are four types of diets to cope with and at a minimum maintain a blood pressure condition, namely a low-salt diet, a low cholesterol diet, limited fat and high fiber, and low calories when overweight [5].

Muzakar and Listriani's [6] studied that hypertensive patient after being given young coconut water and avocado juice with a composition of 300 ml of coconut water and 100 g of avocado meat for seven days. Result showed that there was a decrease in mean systolic blood pressure of 9.34 mmHg and blood pressure diastolic amount of 3.79 mmHg.

Besides coconut water, avocados are also high in various nutrients that can affect blood pressure. Avocados are one of the fruits that are rich in fiber, per 100 grams of flesh the fruit has 7 g of fiber consisting of 25% water soluble and 75% insoluble. Avocado energy comes from 75% monounsaturated fat. Avocados contain a lot of potassium, 60% higher than bananas and good for people with hypertension and anti-bloating substances. Avocados are also rich in vitamin B which is good for increasing appetite, vitamin E as an antioxidant and vitamin K as a deterrent to bleeding [7].

Research of using avocado juice with young coconut water is conducted to see the effectiveness of decreasing systolic and diastolic blood pressure in hypertensive patients, where in avocado-rich potassium and vitamin E and coconut water contain high potassium. The researcher want to know how much influence these substances (fiber, vitamins and potassium) have on blood pressure drop. The second reason with the incorporation of substances in food ingredients can be answered that for treatment with the term back to nature, so avocados and coconut water can be utilized by the community easily. This study aims to determine the effect of avocado juice + young coconut water on elderly hypertensive patients in Palembang in 2017.

II. MATERIAL AND METHODS

The type of research is a quasi-experimental design with pretest-treatment-posttest by using a comparison group, namely the researcher gives direct treatment to the subject [8]. The form of research design as follows:
Treatment group:

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O1 - - - - - - - - - - X1 - - - - - - - - - - O2
Pretest Treatment Post test

Control Comparison Group:
O3 - O4
Pretest Post test

Where, Q1 and Q3 are pretest, these is a measurement of sample blood pressure before being given avocado juice + young coconut water or placebo (green Marjan syrup) using a sphygmomanometer with mmHg. X1 is treatment; it is giving avocado juice + young coconut water and green Marjan syrup. Get once a day in the morning for 7 days. O2 and O4 are post test, it is a measurement of sample blood pressure after being given avocado juice + young coconut water or placebo (green Marjan syrup) after 7 days using a sphygmomanometer with mmHg. The comparison group is the group that measured their blood pressure before and after not getting a placebo (green Marjan syrup). This research was conducted for 7 days. The sample used in this study must meet the inclusion 4 criteria: (i), elderly hypertension patients in Sukarame Subdistrict Palembang, (ii) age ≥ 60 years, (iii) patients with hypertension without severe complications with other diseases (such as kidneys, liver and lungs) that can interfere with research, and (iv) willing to be a sample in research until the completion of the study.

The exclusion criteria are patients who experience severe complications, and patients who experience digestive tract disorders. The procedures of making avocado juice + Young coconut water obtained from peel the avocado and use 100 grams of fruit. Prepare a blender, then avocado meat in a blender by adding 300 ml of young coconut water. Add sugar 1 tbsp. Stir until well blended and ready to be given to the respondent.

In the treatment group, samples were given avocado juice + young coconut water for 7 consecutive days. Blood pressure measurement was measured by a sphygmomanometer device performed by a nurse. The data obtained is then analyzed using computer data. Last, data analysis with t-dependent test.

III. RESULT

Table 1 show that out of 30 samples, those suffering from hypertension in the treatment group were 63.3% (19 people) found mostly in the female sex whereas in the comparison group, 56.7% (17 people) were found in the type male genital. However, when viewed from the total number of respondents in the study most of them suffered from hypertension of the female sex, namely 53.3% (32 people).

This is in line with research conducted by Hafiz et al. [9] (2016) who conducted a study of factors related to the incidence of hypertension in the elderly group in the work area of Badung District I Health Centre I in 2016. This study stated female hypertension patients were 38.8% and male gender hypertension patients were 37.5%.

Table 2 shows that the age of the sample both in the treatment and comparison groups was equal to 80% (24 people) with the age range 65 and above. This is in line with Apriyani's [10] which states that respondents who have ≥ 56 years of age are more at risk of suffering from hypertension, which is 39.5% (17 people).

Table 1. Sample distribution based on gender

Gender	Group			
	Treatment		Comparison	
	n	%	n	%
Male	11	36.7	17	56.7
Female	19	63.3	13	43.3
Total	30	100	30	100

Table 2. Sample distribution based on age

Gender	Group			
	Treatment		Comparison	
	n	%	n	%
Male	11	36.7	17	56.7
Female	19	63.3	13	43.3
Total	30	100	30	100

Table 3 results are in line with research conducted by Muzakar and Listrianah [6] which states that giving avocado juice and young coconut water can reduce systolic blood pressure and diastolic blood pressure. Where there is a decrease in systolic blood pressure of 17.67 mmHg, while the decrease in diastolic blood pressure is 5.66 mmHg. This 2016 study did not differentiate age or in other words not in the elderly category. Therefore from the intake of respondents in the 2016 study, it was much better because the ability to chew and swallow on respondents still functioned well compared to the elderly group.

The results of statistical tests on research conducted by Muzakar and Listrianah [6] stated that there was an effect of giving young coconut water and avocado juice to a decrease in systolic blood pressure and diastolic blood pressure.

This result is in line with research conducted by Muzakar and Listriana [6] which stated that there was no significant effect on the decrease in systolic blood pressure before and after being given placebo (green marjan syrup) in the comparison group. In this study, the average decrease in systolic blood pressure was 3.13 mmHg and an average increase in diastolic blood pressure was 0.67 mmHg.

Table 3. Average blood pressure before and after treatment group

Blood Pressure	Initial Mean ± SD	Final Mean ± SD	P	t
Systolic	163±17.671	150.40±23.528	0.005	3.013
Diastolic	93.73±12.459	88.53±12.765	0.124	1.586

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Table 4. Average blood pressure before and after in comparison group

Blood Pressure	Initial Mean ± SD	Final Mean ± SD	P	T
Systolic	162.37±17.024	159.67±24.770	0.480	0.715
Diastolic	84.23±15.963	82.50±15.833	0.378	0.896

The results in table 4 showed that there was a decrease after being given placebo (green marjan syrup) at systolic blood pressure and diastolic blood pressure. The average decrease in systolic blood pressure is 2.7 mmHg and a decrease in diastolic blood pressure is 1.73 mmHg.

Statistical test results (dependent t test) on blood pressure both systolic and diastolic obtained p-value> 0.05 so it can be concluded that there was no significant effect on the decrease in systolic and diastolic blood pressure after being given placebo (green Marjan syrup) in the comparison group.

Table 5. Average percent intake before and after in treatment group

Average Intake	Energy (kkal)	Potassium (mg)	Sodium (mg)	Fiber (g)	Vit C (mg)
Before	1202.74	648.25	1199.30	7.01	13.11
%Before	70.25	13.79	99.94	29.61	16.52
After	1379.74	2202.76	1207.62	10.31	334.11
%After	80.67	46.57	100.63	43.59	418.36

Based on a preliminary study, by calculating the intake of energy, potassium, sodium, fiber and vitamin C from the daily menu using a computerized calculation of nutrient levels of potassium consumed by the elderly in Werdha Teratai House ± 648.25 mg of potassium/day. When compared with the recommended amount of potassium according to the 2013 AKG, age of 65-80 years, the amount of potassium consumed is 4700 mg per day, it can be concluded that it is less adequate.

The results showed the average intake of potassium respondents after being given avocado juice + young coconut water is 2202.76 mg or reached 46.57%. With the addition of ± 1554.51 mg of potassium in the diet, patients with hypertension are not sufficient. This is due to the intake of respondents who do not meet their needs. In Table 5 it can be seen that after the addition of avocado juice + young coconut water the percentage of potassium intake reaches ± 50% which can reduce systolic blood pressure by 12.60 mmHg and diastolic blood pressure by 5.20 mmHg. It can be assumed that if the potassium intake is increased again from the selection of foods that are high in potassium such as bananas, mung bean porridge, the percentage of potassium intake will be sufficient and the systolic and diastolic blood pressure will decrease.

However, by looking at the results of the final blood pressure, there is a decrease with significant results, namely systolic and diastolic blood pressure p-value <(α) 0.05 which means that there is an effect of avocado juice + young coconut water on blood pressure reduction in hypertensive patients advanced age of the Lotus Lotus Nursing Home in Palembang. Then it can be assumed that giving avocado juice + young coconut water is extended in time so that blood pressure can decrease.

Table 6. Average percent intake before and after in comparison group

Average Intake	Energy (kkal)	Potassium (mg)	Sodium (mg)	Fiber (g)	Vit C (mg)
Before	1161.74	630.09	1202.07	7.1	10.83
%Before	66.15	13.41	100.17	28.85	13.33
After	1230.94	689.19	1208.67	17.97	12.08
%After	69.81	14.66	100.72	73.65	14.94

Based on a preliminary study, by calculating the intake of energy, potassium, sodium, fiber and vitamin C from the daily menu by using a computerized calculation of nutrient levels the amount of potassium consumed by the elderly Lotus lotus ± 630.09 mg of potassium/day. When compared with the recommended amount of potassium according to the 2013 AKG, age 65-80 years, the amount of potassium consumed is 4700 mg per day, it can be concluded that it is less adequate.

The results showed that the average potassium intake of respondents after being given a placebo (green Marjan syrup) was 689.19 mg or 14.66%. This is because the addition of potassium from green marjan syrup is only ± 59.1 mg while the intake of respondents, especially potassium and sodium intake is also not in accordance with the RDA (Recommended Dietary Allowaces) so that the decrease in systolic blood pressure is only 2.7 mmHg and a decrease in diastolic blood pressure only amounting to 1.73 mmHg. It can be assumed that respondents must increase potassium intake from the selection of foods that are high in potassium so that the decrease in blood pressure both systolic and diastolic will decrease more. However, by looking at the results of the final blood pressure there were no significant changes, namely systolic and diastolic blood pressure p-value > (α) 0.05 which means that there is no effect of Marjan syrup on blood pressure reduction in elderly hypertensive patients in WerdhaTeratai House Palembang.

IV. DISCUSSION

Potassium intake in a person can affect blood pressure. Increasing potassium intake can lower blood pressure. This decrease in blood pressure is due to a decrease in vascular resistance due to dilatation of blood vessels and an increase in water and sodium loss from the body of sodium and potassium pumping activity. Normal potassium intake is 4.7 g/day and can be obtained from fruits and vegetables that contain high potassium [11]. The effect of salt intake (sodium) on the onset of hypertension occurs through an increase in plasma volume, cardiac output, and blood pressure. Excessive sodium consumption causes the sodium concentration in the extracellular fluid to increase.

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To normalize it, intracellular fluid is pulled out, so the volume of extracellular fluid increases. Increased extracellular fluid volume causes increased blood volume. In addition, consumption of high amounts of salt can reduce the diameter of the arteries, so the heart must pump harder to encourage increased blood volume through narrower spaces and consequently hypertension [12].

Avocados are fruits that contain nutrients such as protein, riboflavin (vitamin B2), niacin (vitamin B3), potassium and vitamin C. The content of monounsaturated fats that are high in avocados can keep the body from damage to arteries due to malignancy of LDL cholesterol so that it is good for the heart [13].

Vitamin C helps increase the rate of removal of cholesterol in the form of bile acids. This shows that vitamin C or ascorbic acid as one of the antioxidants that is useful to help hydroxylation reactions in the formation of bile salts. With the increase in the formation of bile salts, cholesterol excretion increases so that it can reduce blood cholesterol levels and reduce the risk of thickening of blood vessel walls. Thus, in addition to reducing blood cholesterol levels, vitamin C can also reduce the risk of hypertension by expediting blood vessel channels [14].

V. CONCLUSION

Based on the present study, the following conclusions can be drawn.

a. Respondents in this study were mostly female, amounting to 53.3%.

b. In this study, most respondents in the 65+ year age group were 80%.

c. The results of statistical tests (t-dependent) in the treatment group showed that there was an effect of giving avocado juice + young coconut water to a decrease in systolic blood pressure, but there was no effect of giving avocado juice + young coconut water to decrease diastolic blood.

d. The results of statistical tests (t-dependent) in the comparison group showed no effect of giving placebo (green Marjan syrup) to the decrease in systolic and diastolic blood pressure.

e. The respondent's nutritional intake plus avocado juice + young coconut water in the treatment group for energy 80.67%, potassium 46.57%, sodium 100.63, fiber 43.59% and vitamin C 418.36%.

f. The respondent's nutritional intake plus placebo (green marjan syrup) in the comparison group for energy 69.81%, potassium 14.66%, sodium 100.72, fiber 73.65% and vitamin C 14.94%.

g. As recommendation, patients with hypertension should consume more foods that contain lots of potassium and fiber such as avocado juice and young coconut water and other food ingredients. Also, nutritionists and other health center workers should provide counseling about food ingredients that can be used to reduce blood pressure in hypertensive patients especially food ingredients that are high in potassium and fiber.

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AUTHORS PROFILE

Muzakar had obtained the title of Associate Expert in Nutrition (D.III Nutrition) in 1997 at the Academy of Nutrition of Health Department, Jakarta, and had work experience at Health Center in Betung, Banyuasin Regency (1990 - 1999) as a nutritionist. He had obtained his Diploma IV in Nutrition at Department of Clinical Nutrition, University of Brawijaya in 2001 and finished his postgraduate majoring in clinical nutrition at Gadjah Mada University, Yogyakarta. After completing his postgraduate degree, he became an adjunct lecturer at Health Polytechnic Ministry of Health Palembang at Nutrition Department. His research focuses on clinical nutrition.

Listrianah has working as senior lecturer at the Jurusan Keperawatan Gigi, Poltekkes Kemenkes Palembang, Indonesia. Her main areas of research interest are clinic, care and education of dental.

Ahmad Fudholi, Ph.D, M.Sc obtained his S.Si (2002) in physics. He was born in 1980 in Pekanbaru, Indonesia. He served as was the Head of the Physics Department at Rab University Pekanbaru, Riau, Indonesia, for four years (2004–2008). A. Fudholi started his master course in Energy Technology (2005–2007) at Universiti Kebangsaan Malaysia (UKM). After obtaining his Master's, he became a research assistant at UKM. After his Ph.D (2012) in renewable energy, he became postdoctoral in the Solar Energy Research Institute (SERI) UKM until 2013. He joined the SERI as a lecturer in 2014. He received more than USD 400,000 worth of research grant (16 grant/project) in 2014–2018.

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He supervised and completed more than 30 M.Sc projects. To date, he has managed to supervise nine Ph.D (seven as main supervisors and two as co-supervisor), two Master's student by research mode and one Master's student by coursework mode. He was also an examiner (five Ph.D and one M.Sc). His current research focus is renewable energy, particularly solar energy technology, micropower systems, solar drying systems and advanced solar thermal systems (solar-assisted drying, solar heat pumps, PVT systems). He has published more than 120 peer-reviewed papers, of which 37 papers are in the ISI index (more 25 Q1, impact factor more than 4) and more than 85 papers are in the Scopus index. He has published more than 80 papers in international conferences. He has a total citations of 1246 and a h-index of 17 in Scopus (Author ID: 57195432490). He has a total citations of 1684 and a h-index of 21 in Google Scholar. He has been appointed as reviewer of high-impact (Q1) journals. He has also been appointed as editor of journals. He has received several international awards. He has also been invited as speaker in the Workshop of Scientific Journal Writing; Writing Scientific Papers Steps Towards Successful Publish in High Impact (Q1) Journals. He owns one patent and two copyrights.