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Effect of Vegetable Juice and Probiotic Red Dragon Fruit Juice on Blood Pressure in Pre-Hypertension Patients in the Telaga Dewa Health Center Working Area, Bengkulu City, 2024

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Abstract: - *Hypertension is one of the non-communicable diseases that is the leading cause of death globally. This study aims to determine the effect of giving vegetable juice and probiotic red dragon fruit juice on blood pressure in prehypertensive patients. The design of this research subject group is prehypertension patients with Systolic blood pressure >120mmHg and Diastolic >80mmHg which is divided into 4 treatment groups namely PO, P1, P2, P3 groups. The doses given were PO leaflet education, P1 200ml vegetable juice and leaflet education, P2 200ml probiotic red dragon fruit juice and leaflet education, P3 200ml vegetable juice and probiotic red dragon fruit juice and leaflet education. The intervention was conducted for 7 days. Blood pressure measurements using a Sphygmomanometer, checking blood pressure before and after the intervention. Normality test was performed using Shapiro-Wilk. Statistical analysis using ANOVA test and followed by Duncan test. The results showed the average before the intervention P0 137/87mmHg, P1 137/83mmHg, P2 137/87mmHg, P3 137/85mmHg. Average Systolic and Diastolic blood pressure in the prehypertension group after the intervention P0 132/85mmHg, P1 126/82mmHg, P2 127/84, P3 121/79 mmHg with Systolic blood pressure P-value = 0.002 and Diastolic blood pressure P-value = 0.010. Of the 4 treatments, the best treatment was the P3 treatment. It can be concluded that there is an effect of giving vegetable juice and probiotic red dragon fruit juice on blood pressure in prehypertensive patients in the work area of the Telaga Dewa Health Center, Bengkulu City.*

Keywords: *Hypertension, Vegetable Juice, Probiotic Red Dragon Fruit Juice, Blood Pressure.*

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Introduction

Hypertension is a system disorder in the blood circulation that results in an increase in blood pressure above the normal range of values, which is more than 140/90 mmHg (Prajayanti, 2020). This disease can cause serious risks for sufferers, and can even risk death (Rauf, Ulfiana Djunaid and Siskawati Umar, 2022). Hypertension is a major modifiable risk factor associated with increased cardiovascular disease (CVD) such as stroke, heart failure, and end-stage diabetes, a 5 mmHg reduction in blood pressure is equivalent to a 16% reduction in CVD (Meinert *et al*, 2023).

Hypertension affects more than 1 billion adults and 13% of total deaths worldwide (Farah *et al.*, 2017).According to the World Health Organization (WHO), approximately 1.28 billion adults aged 30-79 years worldwide suffer from hypertension, most of whom live in low- and middle-income countries. One of the global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030 (WHO, 2023). It is estimated that by 2025 there will be 1.5 billion people affected by hypertension, and it is estimated that every year 9.4 million people die from hypertension and its complications (Kemenkes, 2019), which means that hypertension sufferers in the world are very many and the main risk factors that lead to heart disease (cardiovascular) (Zhang and Li, 2018), kidney and stroke which are complications of this disease will also be a lot that's why hypertension is dubbed the "sillent killer" or killer slowly (Rhamadan, Restiana and Bahrudin, 2022).Based on the Basic Health Research (Riskesdas) conducted by the Ministry of Health in 2018 stated that there was an increase in the prevalence of hypertension from 2013 around 25.8%, and in 2018 around 34.1% in Indonesia.Based on data from the Bengkulu City Health Office in 2022, the prevalence of hypertension was 36,404 patients. The highest prevalence of hypertension in the working area of Telaga Dewa Health Center in 2022 amounted to 3,852 people with coverage who received health services of 20.1% (Dinas Kesehatan Provinsi Bengkulu, 2022).

Patients with hypertension can be prevented and treated by pharmacological and non-pharmacological medical therapy (Nabila, 2023). Non-pharmacological therapies that can be given to people with hypertension are such as fruits, vegetables and herbs that we can find in traditional markets (Apriliani *et all.*, 2021).

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Cucumber (Cucumis sativus L) is very good for consumption where the content in cucumber can help lower blood pressure, the content in every 100 grams of cucumber is potassium (potassium) of 73 mg, and phosphorus 24 mg. The mineral content of potassium, magnesium and fiber in cucumbers is beneficial for lowering blood pressure. Magnesium minerals play a role in blood flow. The elements of phosphorus, folic acid and vitamin C in cucumber are useful for relieving tension or stress (Rasyid *et al.*,2024).

Celery has ingredients that play an important role in lowering blood pressure, including magnesium, pthalides, apigenin potassium and asparagine. (Apriliani *et all.*, 2021).

By giving 20 grams of celery with the addition of 200 ml of water in the morning for 7 days (Wiji, Yumita and Yuningsih, 2021).Various studies have shown that regular consumption of celery juice can reduce blood pressure in people with hypertension (Prajayanti, et al 2020; Ekwantini, 2014; Rahmawati and Lelyana, 2010; Alamsyah, et al 2017; Dwinanda, 2018; Ekwantini and Majid, 2019).

Honey is believed to lower blood pressure (Niza N, Sudiarto and Puspasari, 2023). According to research by Kharisma, Sudiarto, and Fida (2023), the results showed a decrease in blood pressure in the elderly by giving honey in the morning at a dose of 20 ml for 7 days with a pre value of 158/95 mmHg and a post value of 138/90 mmHg.

Functional foods are different from drugs because they are not used for treatment, and cannot replace drugs for patients (Chen *et al.*, 2023). Probiotic drinks are one of the functional food products produced from the fermentation process of milk with the help of lactic acid bacteria (LAB) (Journal *et al.*, 2023)

One form of probiotics on the market is yogurt. Yoghurt is known to play a role for health such as immunostimulants that can increase endurance (Indriasari, 2022; Rahayu et al., 2023). In addition, yogurt is also known to reduce hypertension because yogurt contains probiotic bacteria that can encourage the release of proteins that can reduce blood pressure (Roja *et al.*, 2022). with the development of the times yogurt has several types, one of which is fruit yogurt. Fruit yogurt is yogurt added with fruit juice (Jasmine *et al.*, 2020).

Yoghurt is a form of milk with a high concentration of calcium and protein, as well as calcium, malgnesium, and calcium which have been associated with a lowering effect on blood pressure. The nutritional composition of dairy products is one of the salts in several mechanisms that have a beneficial effect on blood pressure, dairy products are a source of calcium that reduces blood pressure through the effect of smooth muscle reclension and valsodilution (Buendia *et al.*, 2018).

Red dragon fruit (Hylocereus polyrhizus) is a fruit of the cactus clan that has the advantage of being rich in fiber, potassium and high antioxidants Vitamin B3 (Niacin), vitamin E, vitamin C, which has the ability to flex blood vessels and stabilize high blood pressure. (Yulianti, Prameswari and Kusmindarti, 2021).

Many studies have used cucumber, celery, honey, dragon fruit and yogurt separately as alternatives in lowering blood pressure, but currently no researchers have examined whether the combination of these ingredients can have a better effect in lowering blood pressure. Based on this description, researchers are interested in examining the effect of giving vegetable juice and probiotic red dragon fruit juice on blood pressure in patients with Pre-Hypertension in the working area of Telaga Dewa Health Center, Bengkulu City in 2024.

Methods

This study uses experimental research with a Randomized Group Design (RAK) research design with a combination of 4 treatments, namely P0 leaflet education, P1 200ml vegetable juice, P2 200ml red dragon fruit juice probiotics, P3 200ml vegetable juice and red dragon fruit juice probiotics for 7 days in prehypertension in the Telaga Dewa Health Center work area. The samples in this study were prehypertensive patients with systolic blood pressure >120mmHg and diastolic >80mmHg. The technique used in sampling is total sampling based on the number of samples, meaning that samples are taken based on predetermined inclusion and exclusion criteria.

The sample size required in this study was calculated using the Federer formula (1991):

$$(n-1)\,(t-1) \geq 15$$

Description:
n = number of samples sought
t = number of treatments
In this study, it is known that there are 4 treatments (t) = 4, namely 1 control group and 3 treatment groups, so the value of n is obtained as follows:

$(n-1)(t-1) = 15$
$(n-1)(4-1) = 15$
$(n-1)(3) = 15$
$3n-3 = 15$
$3n = 18$
$n = 6$

The sample size according to the data above is 6 respondents, which means that the minimum respondent for each is 6 respondents. As for the drop out calculation, namely 1 respondent, the sample size in this study was 7 people in each group so that a total of 28 respondents were obtained.

The research location was carried out in the Telaga Dewa Health Center work area which was carried out in May 2024. The research implementation stage begins with data collection which began in April 2024, the research data taken in the form of primary data, namely, the identity of the respondent and blood pressure. Respondent identity includes name, age, and address data collected through interviews, while blood pressure data is taken using a sphygmomanometer. Furthermore, the intervention group P0 leaflet education, P1 200ml vegetable juice, P2 200ml red dragon fruit juice probiotics, P3 200ml vegetable juice and red dragon fruit juice probiotics for 7 consecutive days.

During the intervention, potassium and sodium intake were also observed using 3x24 hour food recall during the intervention. After the intervention, measurements were taken again on day 7 using a sphygmomanometer.

The analysis used was univariate analysis for numerical data used to find the mean, median, maximum and minimum values and standard deviation. For bivariate analysis using the ANOVA test and followed by Duncan's test to see differences between the four groups of data.

Results and Discussions

1. Respondent Characteristics

Based on the research that has been done, the following results are shown:

Table 1: Distribution of Pre-Hypertension Patients Characteristics

Characteristics	n	%
Age		
40-49	13	46,4
50-59	15	53,6
Total	**28**	**100**
Gender		
Male	7	25,0
Female	21	75,0
Total	**28**	**100**

Source: Research Data, 2024

Judging from Table 1, the characteristics based on the age of the respondents were mostly aged 50-59 years 53.6% (15 people). At the age of 45 - 59 years the risk of hypertension is very high (Amanda *et al.*, 2018)**,** due to the fact that at that age large arteries lose their flexibility so that they become stiff, therefore the blood in each heart is forced to go through narrower vessels than usual and causes an increase in blood pressure (Melania Hidayat *et al.*, 2023)**.**Characteristics of respondents based on gender mostly occurred in women as many as 21 people with a percentage of 75%.Women are higher in hypertension because in women menopause occurs which results in decreased production of the hormone esterogen (Simbolon *et al.* 2020).

2. Mean Systolic and Diastolic Blood Pressure of Prehypertensive Respondents Before and After Intervention

Table 2 shows the mean systolic and diastolic blood pressure before and after the intervention.

Table 2: Average Blood Pressure of Pre-Hypertension Patients before and After Intervention

		Group P0	Group P1	Group P2	Group P3
		Mean± Std.dev	Mean± Std.dev	Mean± Std.dev	Mean± Std.dev
Variables					
TDS	Pre	137.5± 2.070	137.7± 1.799	137.4± 2.936	137.5± 3.101
	Post	132.8± 4.337	126.1± 6.040	127.4± 4.276	121.5± 4.276
TDD	Pre	87.1± 2.545	83.7± 2.138	87.1± 2.734	85.8± 3.485
	Post	85.4± 2.936	82.8± 2.673	84.2± 2.059	79.2± 4.680

Source: Research Data, 2024

Table 2 shows that the average systolic and diastolic blood pressure before the intervention was in the P0 group 137/87 mmHg, P1 137/83 mmHg, P2 137/87 mmHg, P3 137/85 mmHg, and the average systolic and diastolic blood pressure after the intervention was in P0 132/85 mmHg, P1 126/82 mmHg, P2 127/84 mmHg, P3 121/79 mmHg. The results showed that there was a significant decrease in the blood pressure of the respondents after the intervention of vegetable juice and probiotic red dragon fruit salad every 7 days in 200ml because of the potassium content in cucumber, celery, red dragon fruit, dalralh dalpalt becomes less elalstic kalrenal terjaldinyal valsodilaltalsi which dalpaltebalbkaln dalralh becomes more fragile in calculating the damage to peripheral resistance.

Calcium also inhibits the activation of the alngiotensin-converting enzyme, which means that the renin-alngiotensin conversion process is halted and does not lead to an increase in blood pressure (Pitayanti and Yuliana, 2023).Calcium in dalpalt decreases the activation of the renin-alngiotensin system and changes the allirals in the peripheral arteries that affect kidney function (Masyudi, 2018).

3. The effect of vegetable juice and red dragon fruit probiotic combination on prehypertension in Telaga Dewa Health Centre, Bengkulu City

This study was divided into 4 treatment groups, each group including group P0 (control group given education), group P1 (100 gr cucumber, 20 gr celery, 20 ml honey) leaflet, P2 (100 gr probiotics (100 gr red dragon)) leaflet, P3 (100 gr cucumber, 20 gr celery, 20 ml honey and 50 gr probiotics (50 gr red dragon) leaflet). In each group each treatment consisted of 7 respondents

Table 3: One Way ANOVA Test Results

	Variabel	n	Mean	Min	Max	±SD	P-value
Pre	Sistolik	28	137	132	140	2.395	0.997
	Diastolik	28	85	80	90	2.975	0.094
Post	Sistolik	28	127	117	139	6.098	0.002
	Diastolik	28	82	70	90	3.854	0.010

Source: Research Data, 2024

Based on the One Way ANOVA Statistical Test, it shows that the combination of vegetable juice and probiotic red dragon fruit juice on blood pressure for 7 days has a significant effect on reducing Systolic and Diastolic blood pressure in patients with Pre-Hypertension at Telaga Dewa Health Center. Seen in Table 3 in the Sig (P-value) column, that there is a significant difference in Systolic blood pressure P-value 0.002 (<0.05) and Diastolic blood pressure P-value 0.010 (<0.05) indicates that each treatment group after the intervention there is a significant difference.

Table 4: Duncan Test Results

Post Sistolik					**Post Diastolik**			
Group	**n**	**1**	**2**		**Group**	**n**	**1**	**2**
P3	7	121.57			P3	7	79.29	
P1	7	126.14	126.14		P1	7		82.86
P2	7		127.43		P2	7		84.29
P0	7			132.86	P0	7		85.43
Sig		0.087	0.620	1.000	*Sig*		1.000	0.172

Source: Research Data, 2024

Duncan's further test results to find out in detail which data groups are significantly different. Based on the study, the results showed that the most significant difference between the treatment group 3 was 200 ml (vegetable juice and probiotic red dragon fruit juice and educational leaflet). This study is in line with research (Rauf et al. 2022).The administration of celery juice with a combination of carrots and honey to 15 respondents with a volume of 200 cc / day for 7 days, 7 respondents experienced a significant decrease in blood pressure.

There were differences in systolic and diastolic blood pressure in the 4 groups that had been given the intervention. Systolic and diastolic blood pressure in the P0 intervention group after being given an intervention for 3 times in 7 days in the form of education using leaflet media about a low salt diet, provides changes in blood pressure (Notoatmodjo, 2019).Providing education can increase a person's awareness so that they can behave according to their knowledge (Erlina *et al.*, 2021).

Judging from the sodium intake from the recall results, the average of 1946mg is higher than the daily sodium nutritional adequacy of 1500 mg. Potassium intake obtained from the recall results averaged 1364mg lower than the daily potassium nutritional adequacy of 4700mg.

Potassium and sodium consumption contribute significantly to food safety because the preparation process of potassium-containing foods can cause potassium levels to drop when the food is cooked and then re-cooked (Fitri *et al.* 2018). The recommended daily intake can reduce the risk of heart attack in women who have high blood pressure and fall into the mild to moderate category, whereas a low intake of potassium will cause an increase in blood pressure (Appel *et al.*, 2018).

In the P1 treatment with the administration of 200ml of vegetable juice and leaflet education to prehypertensive patients consumed for 7 consecutive days, there was a change in systolic and diastolic blood pressure, a decrease in blood pressure in respondents, this is because cucumbers have potassium content which causes inhibition of the Renin Angiotensin System which also causes a decrease in aldosterone secretion, resulting in a decrease in sodium and water reabsorption in the renal tubules. As a result of this mechanism, there is an increase in diuresis which causes a decrease in blood volume, so that blood pressure drops (Ivana, et al. 2021).

Celery is a nonpharmacological oabat that is useful for lowering blood pressure which contains flavonoids, saponins, tannins, essential oils and apigenin which are effective as tonics that spur digestive enzymes, lower blood pressure, improve impaired hormone function and cleanse the blood. Compounds in apigenin as anti-inflammatory and antibacterial (Suryarinilsih *et al*,2021).

In addition, honey is beneficial for preventing hypertension through its antioxidant properties (Arrawawala et al., 2017). and anti-oxidant properties (Ralmli et al., 2021). One of the contents of honey as an anti-oxidant honey, namely flalvonoid, reduces Systemic Valsculalr Resistalnt (SVR) and affects the work of Alngiotensin Converting Enzym (AlCE) which is able to inhibit the change of angiotensin I to angiotensin II, the effect of valsodilalsi and AlCE inhibitors decreases blood pressure (Fitri et all., 2022). Based on the research of Alluko et all., (2014) giving honey every day for 1 week at a dose of 20 gr can lowers blood pressure.

In the P2 treatment with 200ml probiotic red dragon fruit juice and leaflet education for prehypertensive patients consumed 7 times in a row gave changes to systolic and diastolic blood pressure, a decrease in blood pressure on the respondent was due to the content of probiotic bacteria in yogurt which can encourage the release of proteins that can reduce blood pressure.

Probiotics can either directly or indirectly affect the physiology of the gut through the production of prebiotics, such as TMAlC, SCFAl, and secondary bile acids (Luu *et al.*, 2020). . Probiotics that are more tolerant of extreme pH, high temperature, and low temperature (Chen *et al.*, 2023)The bacterium Lalctobalcillus calsei which is found in yoghurt is one of the probiotic salts which promotes isoleucine-proline-proline (IPP) and vallin-proline-proline (VPP) calcification in fermented milk protein (Robles *et al.*, 2018).These tripeptides decrease the blood pressure by inhibiting the activity of alngiotensin converting enzyme (AlCE), an enzyme that calculates alngiotensin and thus increases the blood pressure. This effect is obtained by the tripeptidal terikaltnyal IPP or VPP paldal realktive side of ACE (Rahayu, 2023).A study

showed that the introduction of yoghurt at 120 grams per day showed a significant reduction in systolic blood pressure over 2 weeks (Daniel dkk, 2017).

The decrease in systolic and diastolic blood pressure is possible because of the minerals contained in red dragon fruit, namely potassium (Susilowati et al, 2023).Apart from containing potassium compounds, red dragon fruit also contains flavonoids and vitamin C which can cause a decrease in blood pressure (Aprianti dkk, 2021).

In the P3 treatment with the provision of 200ml of vegetable juice and probiotic red dragon fruit juice and leaflet education for prehypertensive patients consumed for 7 consecutive days, there were changes in systolic and diastolic blood pressure, the decrease in blood pressure in respondents was due to a combination of both ingredients that were good for the body such as potassium, Vitamin C and there are also active compounds that can reduce blood pressure, one of which is flavonoid content as an antioxidant, flavonoids can inhibit the clumping of blood pieces, stimulate the production of nitric oxide which can dilate blood vessels, and can inhibit the activity of Angiotensin I Converting Enzyme (ACE) which plays a role in the formation of angiotensin II which causes high blood pressure. Angiotensin II constricts blood vessels, and ACE inhibitors dilate blood vessels to allow more blood to flow to the heart, resulting in a decrease in blood pressure (Alwie, 2020).A decrease in blood pressure occurs due to the nutritional content that comes from the consumption of vegetables and fruits outside of daily food consumption and can also be influenced by additional education to increase knowledge and change healthy living behaviour.

Conclusions

From the results of giving in 4 intervention groups where the intervention that most influenced the decrease in blood pressure was in the P3 intervention group with a decrease in blood pressure before being given the intervention, P3 137/85 mmHg and after being given the intervention, P3 121/79 mmHg, with an average difference in systolic reduction of 16 and a decrease in diastolic 6 in the P3 group There is an effect of giving vegetable juice with a combination of probiotic red dragon fruit juice in patients with Pre-Hypertension in the work area of the Telaga Dewa Community Health Centre, Bengkulu City, which means that giving vegetable juice with a combination of probiotic red dragon fruit juice can give a non-harmful effect and can be used as a nonfalrmalkological treatment for Pre-Hypertension sufferers.

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