



Potential Combination of Roselle Flower Water Honey and Dates on Blood Pressure in Hypertensive Patients

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Abstract

High blood pressure is a condition where systolic blood pressure is more than 140 mmHg and diastolic blood pressure is more than 90 mmHg. The aim of the study was to determine the effect of giving roselle flower decoction combined with honey and dates on blood pressure in hypertensive patients. The type of research was an experimental study with a randomized group design (RGD) divided into 4 treatment groups: the control group was given a leaflet, treatment group 1 was given 10 g of roselle, treatment group 2 was given 30 g of roselle, and treatment group 3 was given 50 g of roselle. Administered for 7 days with 1 time per day. The number of respondents was 28 people with a purposive sampling technique. The research instrument used a digital blood pressure monitor, 24-hour recall form, statistical analysis used ANOVA and Duncan's further test. The results showed that there were significant differences from the four treatments, with post-systolic $p < 0.000$ and post-diastolic $p < 0.004$, it can be concluded that each treatment group after the intervention had significant differences. The best result was treatment 3 with a roselle dose of 50 g. There is an effect of giving roselle flower decoction combined with honey and dates on blood pressure in hypertensive patients in the working area of the Telaga Dewa Community Health Center, Bengkulu City. Further research is needed on dose modification and duration of administration for maximum BP reduction.



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Introduction


Hypertension remains the most common risk factor in cardiovascular disease.¹ Hypertension is a clinical

condition characterized by an elevation of systolic blood pressure above 140 mmHg and diastolic blood pressure above 90 mmHg.²

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According to the World Health Organization (WHO), around 1.28 billion adults aged 30-79 years worldwide suffer from hypertension, most of them 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 2030.³

According to the 2018 Basic Health Research (Riskesmas) in Indonesia, the incidence of hypertension among the population aged >18 years was 658.201 diagnosed with hypertension, with a measured prevalence of 34.1%, this represents an increase from 25.8% in 2013. The province with the highest prevalence of hypertension is South Kalimantan at 44.1%, while the province with the lowest prevalence is Papua at 22.2%.⁴ According to the health profile data of Bengkulu City, the estimated number of hypertension patients in Bengkulu City in 2022 was 36.404 people, with 14.812 people (40,7%), receiving standard care. The highest number of cases was found in the working area of the Telaga Dewa Community Health Center, with 3.852 people, and a coverage of those receiving health services at 20.1%.⁵

Hypertension, if not treated and tackled, will cause various complications in the long run. Hypertension is a risk factor for diseases such as heart disease, kidney failure, diabetes, stroke.⁶

Hypertension treatment can be done in 2 ways, namely pharmacological and non-pharmacological methods. Pharmacologically treatment is by using anti-hypertensive drugs, such as diuretics, beta blockers, ACE inhibitors, calcium blocker. Meanwhile, non-pharmacological treatment is reducing stress, weight loss, increasing physical activity and exercise, limiting the consumption of alcohol, sodium and cigarettes, modifying food diet, stopping smoking habits.⁷ In addition, the use of natural ingredients (herbs) such as traditional medicinal plants or plants that have been clinically and preclinically tested can lower blood pressure.⁸ Natural (herbal) ingredients with the development of functional foods are favored by the public due to their practicality and easy availability. Functional foods that have been used for hypertension include roselle flowers, honey, and dates.

Roselle flowers (*Hibiscus sabdariffa* L) are one of the traditional alternative remedies for lowering blood pressure. The active compounds in roselle flowers that can reduce blood pressure are anthocyanins, phenolics, theophylline, leucine, valine, glycine, and ascorbic acid. These active compounds can help improve blood circulation by reducing the degree of blood viscosity, thereby reducing the workload on the heart and lowering blood pressure.⁹ According to Wijaya *et al*, the infusion of 10 g of roselle petals in 200 ml of hot water can reduce blood pressure, namely the normal blood pressure category totaling 10 respondents (30.3%) and the 1st degree hypertension category totaling 23 respondents (69.7%).⁹

Honey is one of the functional foods that has been traditionally believed to lower blood pressure. The study by Kharisma found a decrease in blood pressure in the elderly with the administration of 20 ml of honey in the morning and evening for 7 days, with values decreasing from 158/95 mmHg to 138/90 mmHg.¹⁰

Dates are the main source of energy for people living in Saudi Arabia. The use of dates (*Phoenix dactylifera* L) as a medicinal plant, and a spice in the treatment of various diseases. Ajwa dates are also high in potassium and low in sodium and therefore can be included in the DASH (Dietary approaches to stop hypertension).¹¹ The results of other research showed that there was a difference in the reduction of systolic and diastolic blood pressure between the treatment group and the control group, proving that the administration of ajwa dates 100 g/day for 6 weeks had an effect on blood pressure in the elderly.¹²

Many studies have used roselle flowers, honey and dates separately as alternatives in lowering blood pressure, so far no researchers have examined whether the combination of these three ingredients can have a better effect on lowering blood pressure. Based on this description, the researcher is interested in researching the effect of giving boiled water of roselle flowers combined with honey and dates on blood pressure in hypertensive patients in the working area of the Telaga Dewa Health Center, Bengkulu City in 2024.

Materials and Methods

Materials Preparation

The ingredients used are roselle flowers, honey and ajwa dates. The preparation of ingredients is carried out by the first way of washing the roselle flowers, the second weighing each ingredient according to the dose given, the third is boiling the roselle for 15 minutes, the fourth is the addition of honey and date juice with each dose. The dose used is roselle flowers with each treatment dose of 10 g, 30 g and 50 g roselle flowers, 20 ml of honey, 50 g ajwa dates brewed 2010 ml of hot water.

Preparation of Roselle Flower Decoction

Firstly, prepare all the ingredients and do the weighing according to the treatment group. Secondly, wash the roselle flower ingredients. Thirdly, boil or cook roselle flowers with 300 ml of

water to boil. Fourthly, cool the roselle flower stew to cool and then put it in a 200 ml bottle and add 50 ml date juice and 20 ml honey. Finally, the roselle flower stew is ready to serve.

Design and Sampling Techniques

This type of research is an experimental research with a group randomized design research design (RAK) see in figure 1, namely: with a combination of 4 treatments, namely treatment 1 was given a dose of roselle 10l g, treatment 2 was given a dose of roselle 30 g, treatment 3 was given a dose of roselle 50l g and the control treatment was only given leaflets. The sample appearance technique is purposive sampling, the number of samples in this study is 28 people with hypertension, The determination of sample size is carried out using the Federer formula (1991)¹³ :

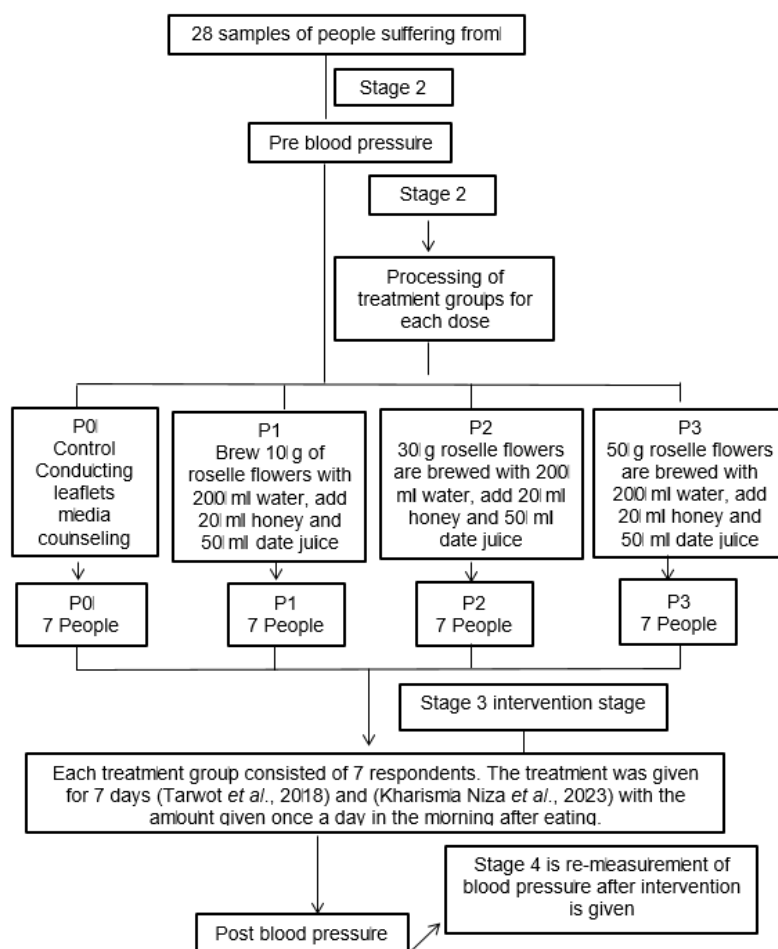


Fig.1: Schematic of The Experimental Design

$$(k-1)(r-1) \geq 15$$

Information:

k = number of samples searched

r = number of treatments

In this study, it is known that there were 4 treatments ($r = 4$), namely 1 control group and 3 treatment groups, so that the n value was obtained as follows:

$$(k-1)(r-1) = 15$$

$$(k-1)(4-1) = 15$$

$$(k-1)(3) = 15$$

$$3k-3 = 15$$

$$3k = 18$$

$$k = 6$$

Based on calculations using the Federer formula, the number of samples according to the data above is 6 respondents for each treatment group. As for the calculation of the drop out, it is 1 respondent. So, the sample size in this study is 7 people in each group so that a total of 28 respondents are obtained.

Location and Time of Research

The research was carried out in the working area of the Telaga Dewa health center, Bengkulu city. The research time was carried out for 1 week from April 29, 2024 - May 9, 2024.

Data Collection and Data Analysis Techniques

The types of data used are primary data and secondary data. Primary data collection with the target of pre-elderly, age range of 45-59 years. The research instrument used food recall for 3 days. Analyze nutritional value using the nutrisurvey application. The tool used to measure blood pressure is the Omicron brand digital blood pressure monitor. The data taken included name, age, gender, and address. Secondary data in the form of data on the highest prevalence of hypertension obtained from the City Health Office and an integrated recording and reporting system book for hypertension patients at the Telaga Dewa Health Center in the Telaga Dewa Health Center area, Bengkulu City. Data analysis was determined by univariate analysis which included numerical data using mean or average, median, maximum and minimum values as well as standard deviations, while bivariate analysis used statistical tests using SPSS version

22 made in America (2013) using the anova test, if related then continued with the Duncan test to see which treatment group was most significant in reducing blood pressure.

Results

The characteristics of hypertensive patient respondents in this study are age, sex, occupation and education. These results can be seen in table 1.

Table 1: Characteristics Responding

No	Variable	Frequency	Percentage (%)
1.	Age		
	30-49	12	42.9
	50-64	16	57.1
	Totally	28	100
2.	Sex		
	Man	7	25
	Woman	21	75
	Totally	28	100
3.	Education		
	Not in school	0	0
	SD	2	7.1
	SMP	8	28.6
	SMA	18	64.3
	Totally	28	100
4.	Work		
	IRT	18	64
	Wiraswasta	10	36
	Totally	28	100

Note: IRT : Housewife

SD: Elementary School

SMP: Junior High School

SMA: Senior High School

Based on table 1, The characteristics of the respondents showed that most of the age of hypertension sufferers was 50-64 years old (57.1%), most of the gender of the respondents (75%) were female, the education of the respondents was mostly high school (64.3%) and the occupation of most housewives (64%).

This study states that the average results of blood pressure in each treatment group, the control group was given a leaflet the results before the intervention were 157/91 mmHg and after the intervention were 153/91 mmHg. In treatment group 1 given

a dose of roselle flowers 10 gr the results before the intervention were 153/97 mmHg and after the intervention were 142/85 mmHg. While the treatment group 2 was given a dose of 30 gr roselle flowers, the results before the intervention were 149/98

mmHg and after the intervention were 137/84 mmHg. Finally, treatment group 3 was given a dose of 50 grams of roselle flowers, the results before the intervention were 156/99 mmHg and after the intervention were 120/81 mmHg.

Table 2: Blood Pressure Picture Before and After Treatment

Treatment group	Systolic		Diastolic	
	Pre Systolic	Post Systolic	Pre diastolic	Post diastolic
Treatment 1	153	142	97	85
Treatment 2	149	137	98	84
Treatment 3	156	120	99	81
Control	157	153	91	91

Source: Descriptive Statistics

Table 3 : The Effect of A Decoction of Roselle Flowers Combined with Honey and Dates on Hypertension Sufferers

	Variable	N	Mean±SD	Min	Max	P
Before	Systolic	28	154±5.3	140	159	0.029
	Diastolic	28	96±5.7	86	106	0.049
After	Systolic	28	141±10.6	120	158	0.000
	Diastolic	28	86±5.2	80	1015	0.004

Source : Anova statistics

Table 4: The Best treatment Among the 4 Treatments

Group	Post systolic			Post diastolic				
	N	1	2	3	Group	N	1	2
Treatment 3	7	120			Treatment 3	7	81	
Treatment 2	7	137	137		Treatment 2	7	84	
Treatment 1	7		142		Treatment 1	7	85	
control	7			153	control	7		91
Sig		149	179	1.00	Sig		221	1.00

Source: Duncan Statistics

Based on the results of the ANOVA one-way test, it was shown that the combination of roselle flower boiled water, honey and dates on blood pressure for 7 days had a reall effect on the reduction of systolic and diastolic blood pressure in hypertensive patients at the Telaga Dewa Health Center in this study. This

can be seen in table 3 (p<0.05). Based on the results of the anova test all significance values obtained results, namely, systolic blood pressure before is p<0.029, systolic blood pressure after is p<0.000, diastolic blood pressure before is p<0.049, diastolic blood pressure after is p<0.004

To find out the difference between each treatment, it can be known with a real difference test where in this study the Duncan test technique was chosen. Based on the real difference test or Duncan test, it was shown that the four treatments, namely control (P0), treatment 1 (P1), treatment 2 (P2), treatment 3 (P3) had a real effect on the reduction of systolic and diastolic blood pressure in hypertensive patients in the Telaga Dewa Health center area. It can be seen in the post-systolic and diastolic tables that treatment 3 is in first order which shows that the third treatment is the best treatment with systolic blood pressure of 120 mmHg and diastolic 81 mmHg. In treatment 2 was in second place and treatment 1 was in third place with systolic blood pressure of 137 mmHg and 142 mmHg while diastolic 84 mmHg and 85 mmHg showed that treatment 1 and 2 were not better than treatment 3, but compared to control treatment 1 and 3 were better than treatment of the control group.

Discussion

The research results showed that the majority of respondents were 50-64 years old, with a total of 16 people (57%). In line with research Nuraeni the results of the study show that those with an older age (≥ 45 years) are more at risk of suffering from hypertension when compared to those who are young (<45 years old).¹⁴ (see Table 1)

The gender of respondents is mostly female (75%). In line with research Diba *et al* of the 68 samples, it is known that the gender group that experienced hypertension was mostly women, namely 37 respondents or 54.5%.¹⁵ The results of this research are supported by several studies such as those found by Irawan *et al* women will experience an increased risk of high blood pressure (hypertension) after menopause, which is over the age of 45 years. Women who have not yet menopause are protected by the hormone estrogen which plays a role in increasing HDL (High Density Lipoprotein) levels. Therefore, when women have menopause, they will be equally at risk of developing hypertension.¹⁶ (see table 1)

The education of the respondents was mostly high school education 64% (18 people). In line with the research of Sutrisno *et al* the level of education has a strong influence on hypertension control behavior.¹⁷(see table 1)

Most of the respondents' jobs were housewives as many as 16 people (64%) In line with research conducted by Susanti *et al* the work of the majority of respondents (38.6%), many housewives who suffer from hypertension complain of lack of exercise, because they are busy taking care of their homes and children so that they do not have free time to do sports and the many mental burdens that cause high blood pressure to be difficult to control.¹⁸ (see table 1)

This study was divided into 4 treatment groups, namely group P0 (control group given education), group P1 (roselle flower dose group 10 g), group P2 (roselle flower dose group 30 g), and group P3 (roselle flower dose group 50 g). In each group, each treatment consisted of 7 respondents. (see in figure 1)

The results of the anova test showed the difference in the average blood pressure values of the respondents in each treatment group after being given the intervention between the control treatment, treatment 1, treatment 2, and treatment 3. From all treatment groups, systolic blood pressure p value 0.0010 (<0.05) and diastolic blood pressure p value 0.004 (<0.05) showed that there was a significant difference in each treatment group after the intervention (see table 2). However, the blood pressure sequence has not reached the normal limit because there are many factors that affect it, namely during the study there were still many respondents who consumed salty foods whose sodium levels were quite high which could cause unstable blood pressure and were not accompanied by Healthy food as evidenced by the results of the recall for 3 non-consecutive recalls, the average recall was the first day of 1890 mg, The second day was 1737 mg and the third day was 1875 mg higher compared to the daily sodium AKG which was 1500 mg. In addition, the length of the study and lack of physical activity such as exercise can also affect blood pressure. In line with research conducted by Jenti Sitorus that there is a relationship between salt intake and the incidence of hypertension with a p-value of 0.021 ($p < 0.05$).¹⁹ Poor salt intake has a 3 times greater risk of developing hypertension than patients with good salt intake. In line with the research of Suzana *et al* showed that sodium intake is one of the important factors affecting hypertension control, with subjects consuming sodium more than 2400 mg/day at a triple risk of developing uncontrolled hypertension.²⁰ In line with research conducted by Mat Nasir *et al*

found that those who suffer from hypertension have a much lower potassium intake (2.3 g/day) than those who do not suffer from hypertension (2.4 g/day), even though low potassium intake can also cause the risk of hypertension. Potassium, which plays an important role in cell metabolism as well as electrolyte and fluid balance, affects blood pressure in the opposite way to sodium due to the action of the sodium-potassium pump.²¹

The results of the test continued *Duncan* to find out in detail which data groups differed significantly. Based on the study, it was shown that the best dose was 50 g of roselle, 20 ml of honey and 50 g of dates in the treatment group 3. This research is in line with the research of *Wijaya et al* in Rohaendi, H. (2008) that roselle flowers can lower blood pressure, roselle flowers (*Hibiscus sabdariffa*) in lowering blood pressure because they contain anthocyanins that have the ability to maintain the elasticity of blood vessel walls, the more elastic the blood vessel walls, the smaller the systemic resistance.⁹ In line with the research of *Melani and Eka Sudiarti* the administration of roselle flowers was obtained as a result of the effect of giving roselle flower decoction, blood pressure in the elderly with a ratio of TD: 183/98 mmHg decreased until the third day obtained TD: 168/94 mmHg.²² In line with research conducted by *Ahad et al* *Hibiscus sadariffa* L given to hypertensive rats as much as 250 mg for 2 weeks can provide the effect of hypotension losartan.²³ The anti-hypertensive activity of roselle may be related to various synergistic mechanisms such as diuretic effects and blocking of the renin-angiotensin-aldosterone system.²⁴

Another study stated that roselle *sabdariffa* flowers contain anthocyanins which was phenolic compounds from flavonoids and one of the water-soluble pigments in plants.

These compounds contribute to *Hibiscus sabdariffa* L ability to work as antihypertensive, antihyperlipidemia, antiobesogenic, antidiabetic, and all produce anti-Alzheimer's natural products.²⁵ In addition, roselle also contains tocopherols known as biological antioxidants that can prevent or slow down the oxidation of body lipids, which include polysaturated fatty acids and cellular lipid components.²⁶ The main anthocyanins are hibiscin and gossypicyanin which can lower blood pressure.²⁷ Based on

research by *Efosa et al* dried flower petal extract at a temperature of 30°C shows higher antioxidant and antihypertensive potential.²⁸ Based on research conducted by *Nurfardillal et al* the administration of roselle flower extract can produce antihypertensive activity, for 2 weeks of administration of rosella flower extract before the administration of katopril can significantly affect the pharmacokinetics of katopril.²⁹ In line with the research of *All-Anbaki et al* that *hibiscus sabdariffa* L (roselle flower) with adjusted doses (10, 15, and 20 g daily according to clinical response) for 4 weeks can lower high blood pressure in some patients with or without antihypertensive drugs.³⁰ In addition, a study conducted by *Ekafrawy et al* that the combination of rosella flower and *olea europaea* leaf extract showed comparable antihypertensive and safety in patients newly diagnosed with grade 1 hypertension.³¹ Based on research by *Salem et al* that hot rose flower extract produces antihypertensive effects through a decrease in plasma ACE, angiotensin II, and aldosterone levels.³²

In addition, honey is beneficial in preventing hypertension through its antioxidant and anti-inflammatory effects.³³ One of the anti-oxidants of honey is flavonoids, flavonoids reduce Systemic Vascular Resistance (SVR) and affect the work of Angiotensin Converting Enzyme (ACE) which is able to inhibit the change of angiotensin I to angiotensin II. The vasodilation effect and ACE inhibitors lower blood pressure.³⁴ Flavonoids have been linked to diuretic effects on honey.³⁵ Flavonoids found in honey, such as quercetin and kaempferol, showed results in cardiovascular treatment, treatment with 10 mg/kg quercetin for 13 weeks lowered blood pressure and heart rate in hypertensive rats.³⁶ In line with research conducted by *Kharisma Niza et al* the results of the study, there was a decrease in blood pressure in the elderly by giving honey in the morning and evening at a dose of 20 ml for 7 days with values before 158/95 mmHg and values after 138/90 mmHg.¹⁰ Another study conducted by *Musyayyadah et al* showed a significant effect of a honey solution intervention with honey doses of 35 and 70 g on systolic and diastolic blood pressure in the elderly.³⁷ Based on the research of *Ramli et al* that there is a high concentration of nitrous oxide (NO) vasodilating agent in honey that contributes to the therapeutic effect on hypertension.³³

One of the fruits that can lower high blood pressure is dates, ajwa dates contain carbohydrates, dietary fiber, fats and various types of amino acids and vitamins, have anti-free radical, antioxidant, antimutagenic, antimicrobial, anticancer and immunostimulant activities. Antioxidant activity is caused by a variety of phenolic compounds, alkaloids, sterols and flavonoids found in ajwa dates.³⁸ The content of flavonoids includes quercetin, orientin, and flavanon. The flavonoid content in 100 grams of dates analyzed varied greatly and ranged from 68.88 to 208.53 mg RE.¹² Dates are a rich source of phenolics and flavonoids so they have a potential role in protecting against cell damage caused by oxidative stress produced by free radicals produced in the body.³⁹ Dates contain gallic acid which is known as an antioxidant compound that functions to reduce chronic stress and pathogens such as cancer, degenerative diseases and metabolic diseases. In addition, according to research conducted by Alam *et al* dates also contain melanin, date melanin shows an ACE inhibitory effect.⁴⁰ In line with the research of Husalidah *et al* consuming dates for 30 days with a dose of 7 grains/day (100 gr/daly) with the results of the study there was a significant difference between before and after the administration of ajwa dates in a positive direction.⁴¹ Giving ajwa dates can affect changes in blood pressure. In line with the research of Syafriati and Ana that there is an effect of giving date juice on reducing blood pressure in elderly patients at the Pengarayan Heath Center in 2023, this is because dates have potassium content, a food that is high in potassium can stabilize blood pressure.⁴² In line with the research of Pratiwi *et al* that the respondents potassium levels increased after consuming date infused water for 7 daly.⁴³

Micronutrients that play an important role in the development of hypertension are partly due to excessive intake of sodium (Na) in a certain amount of time and also due to an imbalance in potassium (K) intake.⁴⁴ Excessive sodium consumption causes the sodium composition in extracellular fluids to increase. The increase in the volume of extracellular fluid causes an increase in blood volume, which has an impact on the onset of hypertension.⁴⁵ Potassium intake that is in accordance with the recommended minimum potassium requirement in a day can lower blood pressure in women suffering from hypertension with mild to moderate categories.⁴⁴ Low potassium intake can result in an increase in

blood pressure, and vice versa with a high intake of potassium can cause a decrease in blood pressure due to a decrease in vascular resistance.⁴⁶ Damage to blood vessels can be prevented by consuming fiber. Dietary fiber can help increase cholesterol excretion through feces by increasing the transit time of foodstuffs through the small intestine. In addition, the consumption of vegetable and fruit fiber will accelerate satiety. This situation is advantageous because it can reduce energy intake and obesity, and will ultimately reduce the risk of hypertension.⁴⁷

Conclusion

This study concluded that the average blood pressure results in each treatment group, the control group given leaflets before the intervention was 157/91 mmHg and after the intervention was 153/91 mmHg. In treatment group 1 which was given a dose of 10 gr of roselle flowers before the intervention was 153/97 mmHg and after the intervention was 142/85 mmHg. While treatment group 2 which was given a dose of 30 gr of roselle flowers before the intervention was 149/98 mmHg and after the intervention was 137/84 mmHg. Finally, the best treatment treatment group 3 was given a dose of 50 gr of roselle flowers, before the intervention was 156/99 mmHg and after the intervention was 120/81 mmHg. With the results of the ANOVA test, namely that there was a significant difference between the four treatments, the results obtained were systolic blood pressure p value 0.000 (<0.05) and diastolic blood pressure p value 0.004 (<0.05), so it can be concluded that each treatment group after the intervention had a significant difference.

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Conflict of Interest

All of authors declare there is no conflict of interest.

Data Availability Statement

Data within the article will be provided upon a justified request. Raw data was available in our research report and originated.

Ethics Statement

This ethical statement is valid for the period from March 1, 2024 to March 1, 2025, ethical number: No.KEKP.BKL/048/03/2024. Issued by the Bengkulu Ministry of Health Polytechnic.

Authors' Contribution

RetnoAprillia: as the main researcher, conceptualizing and designing research, preparing manuscript drafts and reviewing manuscripts. Tonny Cortis Maigoda: as Corresponding author analyzing data, translating from Indonesian to English. Desri Suryani: correspondence to journal editors. Anang Wahyudi: making manuscript layout. Ahmad Rizal: correcting word spelling editing the final stage of the manuscript.

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