Jurnal Jamu Kusuma
Vol. 4, No 1, June 2024, page 19-27

p-ISSN:2798-0332 (print)
e-ISSN: 2798 558x (online)

LITERATURE STUDY OF THE BENEFITS OF ROSELLA PETALS (Hibiscus sabdariffa L.) AS ANTIHYPERTENSION

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ABSTRACT

Roselle (Hibiscus sabdariffa L.) has various benefits such as antihypertensive, antifungal, anti-inflammatory, antidiabetic, antioxidant, and antibacterial. This research aims to determine the benefits of roselle petals as an antihypertensive using a literature study method with data sources obtained from a database. Searches for scientific articles were carried out on databases, namely Google Scholar, Semantic Scholar, and Research Gate using the keywords "Rosella petals as antihypertensive", "Rosella as antihypertensive", "Rosella petals", "Hibiscus Sabrina L.", "Antihypertensive" and "Antihypertensive". From the results of data searches from the three databases published in 2018-2023, screening was carried out through titles and abstracts as well as inclusion and exclusion criteria, resulting in 12 articles that were finally analyzed. Based on the review that has been carried out, the result showed that roselle petals contain anthocyanin and quercetin compounds which are included in the flavonoid group to reduce blood pressure which work through a mechanism that inhibits inflammation, leading to vasodilation which causes increased blood pressure and functions as an ACE inhibitor. Roselle petals are also useful in lowering the pulse rate, as antioxidants and neoroprotective properties. Based on the results obtained, it can be concluded that roselle petals were useful as antihypertensives.

Keywords: *Hypertension, Hibiscus sabdariffa L.*

INTRODUCTION

The main cause of premature death worldwide is hypertension. Hypertension has the risk of causing stroke, kidney failure, coronary heart disease and even death (Yustikarani and Prasetyaningrum, 2020). As many as 1.28 billion adults aged 30 to 79 years suffer from hypertension and 46% of people with hypertension are not aware that they have hypertension (WHO, 2023). Basic Health Research (Kementerian Kesehatan RI). estimates that 1/3 of hypertension cases in Indonesia are diagnosed and the rest are undiagnosed. The prevalence of hypertension in Indonesia is 34.1%, up from 25.8% in the 2013 Riskesdas (Rosliana, 2022). Prevention efforts need to be made to prevent hypertension by using herbal medicines because they have low side effects and do not cause dependence (Damanik, 2023).

Hypertension is a condition when systolic blood pressure is more than 140 mmHg and diastolic blood pressure is more than 90 mmHg (Sari, 2021). Hypertension can be called the silent disease or the silent killer because sufferers of hypertensive disorders are not aware that they suffer from hypertension and do not know before having their blood pressure checked (Widiyanto, 2021). Symptoms of hypertension according to the Indonesian Ministry of Health (2018) are headaches, anxiety, heart palpitations, dizziness, blurred vision, and fatigue.

Management of hypertension can be done using non-pharmacological and pharmacological treatments. Regulating salt consumption, exercising regularly, limiting fat consumption, controlling the amount of sugar consumed, and avoiding alcohol consumption are included in non-pharmacological therapy (Flack, 2020). Pharmacological therapy to

prevent hypertension can use herbal medicines. Herbal therapy is a therapeutic method that utilizes plant parts that are effectively used as medicine (Putri, 2021). Other research related to the benefits of roselle petals as a therapy for a disease, namely that water extract of roselle petals at a dose of 1 mg/kg BW to 1000 mg/kg BW has an antihypertensive effect in test animals and does not cause toxic effects (Hopkins, 2014). A dose of 2.8 grams/70 kgBB or 40 mg/kgBB dry extract of roselle petals (*Hibiscus sabdariffa L*.) has antihypertensive activity (Susilawati et al, 2020). A total of 2 grams of dried roselle petals brewed in 150 ml given for 7 days is effective in reducing systolic and diastolic blood pressure in hypertensive patients (Harmili *et al.*, 2019).

Research on the benefits of roselle petals as an antihypertensive has been carried out in various research articles, but there has been no review of the results of this research. Therefore, the author is interested in conducting a literature study on the benefits of roselle petals as an antihypertensive.

METHOD

This type of research uses the method of writing a literature study or literature review. The output of this literature study is the collection of references that are relevant to the formulation of the problem (Pilendia, 2020). The data used in this research is secondary data obtained not from direct research or direct observation, but using data from previous research results. The population in this study were all journals published in the database, namely Google Scholar, Semantic Scholar, and Research Gate related to the topic of the benefits of roselle petals (*Hibiscus sabdariffa L.*) as antihypertension. The samples that will be used in this research are 12 journals related to the benefits of roselle petals (*Hibiscus sabdariffa L.*) as antihypertensives.

The inclusion criteria in this research are based on journals that have been published on Google Scholar, Semantic Scholar, and Research Gate in 2018 - 2023 and discuss the benefits of roselle petals as antihypertensives. The variable in this study is a single variable, namely the benefits of roselle petals (*Hibiscus sabdariffa L*.) as antihypertension. The following steps in collecting data are by identifying through the Google Scholar, Semantic Scholar, and Research Gate databases using keywords according to the research topic; Search for articles and group the journal articles you are looking for using keywords in the database about the benefits of roselle petals as antihypertensives; Look for a maximum of 30% similarities and differences in the journal articles that have been obtained then group them for analysis regarding the suitability of the journal article to the research topic; Make a summary by noting important points and their relevance according to the research problem to avoid elements of plagiarism; Evaluate all scientific papers read by ensuring the journal to be used meets the criteria and is appropriate to the problem being researched.

RESULTS AND DISCUSSION

By the literature techniques in this research, researchers found several similarities and dissimilarities in the roselle calyx samples as antihypertensives. What the 12 journals have in common are roselle petals as antihypertensives and the content of phytochemical compounds in roselle petals. The similarity of roselle petals as an antihypertensive is that it affects reducing blood pressure so it has the potential to be an antihypertensive. Then the similarities in the phytochemical content in roselle petals are the compounds quercetin and anthocyanin which are included in the group of flavonoid compounds in roselle petals.

The difference in the 12 journals is that the benefits of roselle petals are not only antihypertensive by lowering blood pressure which works through a mechanism of inhibiting inflammation leading to vasodilation which causes increased blood pressure and functions as an ACE inhibitor, roselle petals are also useful in lowering the pulse rate and as an antioxidant.

The anthocyanin compound contained in roselle petals is a natural pigment that gives the roselle petals a red color and has antioxidant properties. Anthocyanin is a type of flavonoid compound. The flavonoid substances that play the most role in roselle petals include anthocyanin, gossypetin, and the glucoside hibiscin. This substance functions as a diuretic, reducing blood viscosity, lowering blood pressure, and stimulating bowel movements (Kusumastuti, 2014). The anthocyanin and quercetin compounds in dried roselle petals are the main components responsible for the antihypertensive effect (Nurfaradilla, 2019).

Research conducted by (Al-Anbaki *et al*., 2021) tested the effect of lowering blood pressure with roselle calyx decoction. The sample used was 10 grams of roselle petals in 0.5 liters of water per day. The final participants who met research inclusion were 31 women and 16 men who were included in the treatment or sample group and 45 people who were included in the control group.

After 6 weeks of consumption, there was a decrease in systolic and diastolic blood pressure, the proportion of participants who reached the target blood pressure (<140/90 mmHg) after 6 weeks, and the percentage of participants whose changes in systolic blood pressure experienced a clinically significant decrease was defined as a decrease of at least 10 mmHg. The anthocyanin and hibiscus acid content in roselle petals is useful for inhibiting ACE activity.

Research conducted by (Bourqui *et al.,* 2020) tested the effectiveness of roselle calyx tablets, roselle calyx infusion, kinkeliba (*Combretum micranthum*) tablets, and kinkeliba (*Combretum micranthum)* infusion in managing hypertension. It has the same effectiveness as captopril in managing hypertension. The required roselle petals tablets are 2 x 375 mg per day while 10 grams of roselle petals are brewed for one day. Participants in each intervention group had achieved the desired blood pressure target of less than equal to 140/90 mmHg after 1, 3, and 6 months. The results of the differences in the use of tablets and infusion showed a greater reduction in blood pressure with infusion of roselle petals compared to tablets with roselle petals. This can be explained by the hypothesis that the amount of active substance in roselle petals that is absorbed through steeping is higher than in roselle petals tablets. The polysaccharides, organic acids, and anthocyanins contained in roselle petals in tablet and infusion form provide a modulating effect on aldosterone activity and an ACE inhibitory effect.

Research conducted by (Sugiarti, 2018) tested the effectiveness of roselle petal and garlic tea. The research method used was an experiment with a one-group pre-test, and post-test design and using Wilcoxon and Mann Whitney test data analysis using the SPSS computer program. A total of 16 respondents were needed for the garlic steeping group and 16 respondents for the roselle petals steeping group. Roselle petal tea given to 16 respondents and consumed 2 times a day for 7 days succeeded in lowering blood pressure.

Brewing roselle petal tea contains important ingredients, namely active compounds, organic acids, and flavonoids, which are useful as antioxidants that reduce blood viscosity which causes blood pressure to fall. Blood viscosity affects blood pressure because high or thick blood viscosity will make the heart work harder to pump blood so that blood pressure becomes high.

Research conducted by (Harmili *et al.*, 2021) tested the effectiveness of roselle petals on blood pressure using a quasi-experiment type of research with a research design using pre-test and post-test. The pre-test was carried out on the first day before the intervention was given and the post-test was carried out on the 8th day after the intervention was given. Respondents were divided into 2 groups, namely 18 respondents as the control group and 17 respondents as the intervention group.

A total of 2 grams of dried roselle petals boiled in 150 ml of hot water for 5 minutes to drink every morning for 7 days was given to respondents in the intervention group while no intervention was given to the control group. On the 8th day after the post-test was carried out, the blood pressure results of the intervention group respondents showed the effect of reducing blood pressure. The pre-test results, the average systolic blood pressure of the intervention group was 148.88 mmHg and the post-test systolic blood pressure results were 136.24 mmHg, giving a decrease of 12.64 mmHg. The average pre-test result of diastolic blood pressure in the intervention group was 97.76 mmHg and the post-test result was 86.18 mmHg, providing a reduction in diastolic blood pressure of 11.58 mmHg. Decoction of roselle petals can lower blood pressure by reducing blood viscosity because roselle petals contain anthocyanin compounds.

Research conducted by (Nugroho, 2022) examined the effectiveness of bay leaves *(Syzygium polyanthum)* and roselle petals (*Hibiscus sabdariffa L.*) in lowering blood pressure. The research design used was to conduct a pre-test and post-test on the sample. The pre-test was carried out on the first day and the post-test was carried out on the eighth day after giving the intervention. The sample used was 18 people included in the control group, 17 people included in the bay leaf intervention group, and 17 people included in the roselle petal intervention group.

The research was carried out by giving a decoction of 2 grams of dried roselle petals which were boiled in 150 ml and then drunk warm/cold. A decoction of roselle petals is given for 7 days. The result is that bay leaves and roselle petals both have the effect of lowering blood pressure. The average blood pressure at the time of the pre-test was 148.88/97.59 mmHg, decreasing to 136.24/86.18 mmHg. From the results of giving boiled roselle petals for 7 days, it was found that blood pressure decreased by 12.64/11.41. mmHg. Meanwhile, the average blood pressure during the pre-test was 145.35/95.24 mmHg, decreasing to 135.71 mmHg. As a result of giving boiled bay leaves for 7 days, blood pressure decreased by 9.64/9.71 mmHg. Decoction of roselle petals provides a greater reducing effect compared to decoction of bay leaves. Decoction of dried roselle petals is effective in lowering systolic and diastolic blood pressure in hypertension sufferers because it contains anthocyanin compounds which act as a diuretic, lowering blood pressure and reducing blood viscosity.

Research conducted by (Oyeniran *et al.*, 2022) examined the effects of roselle petal tea on blood pressure. Participants were divided into two intervention groups. The first group was given roselle petal powder in a tea bag. Each tea bag contained 2 grams of roselle petal powder to be brewed with 750 ml of boiling water for 5 minutes. The second group was given a placebo which had previously been prepared by adding 16-18 drops of food coloring to get the same color as roselle petal tea and then brewing it with 750 ml of boiling water. The results obtained show that roselle petal tea can reduce systolic blood pressure and lower pulse rate compared to placebo. The anthocyanins, polyphenols, and hibiscus acids contained in roselle petals play a role in lowering blood pressure.

Research conducted by (Rustiani *et al.,* 2021) tested the effectiveness of a liquid herbal combination of papaya leaves and roselle petals as an antihypertensive. Liquid herbal preparations are hedonically tested and stability tested to obtain the best formula. The formula obtained consisted of 0.23% thick papaya leaf extract, 14% roselle calyx simplicia powder, 1.5% sodium benzoate, and 16% honey sweetener in 250 mL of liquid herbal preparation. The animals used for the experiment were male white rats of the Sprague-Dawley strain with a body weight of around 200-300 g. A total of 20 mice with this classification were divided into 5 treatment groups with each group consisting of 4 mice.

In the first group as positive control I used an herbal medicine brand .27 ml/200 gBB, the fourth group as dose II used liquid herbal at a dose of 0.54 ml/200 gBB and the fifth group

was only given water. The best results obtained for lowering blood pressure were found in the treatment group given dose II. Liquid herbal dose II has the potential to reduce diastolic blood pressure comparable to the positive control group. The dose I and dose II have the potential to reduce systolic blood pressure, but the resulting reduction is not comparable to the positive control group. The anthocyanins and organic acids contained in roselle petals play a role in lowering blood pressure by acting as ACE inhibitors.

Research conducted by (Aryantini, 2020) tested purified roselle calyx extract as an antihypertensive in Sprague Dawley rats. Antihypertensive activity test to prove that the active compounds in roselle petals can lower blood pressure. Purified extract of roselle petals is made by maceration extraction which is then evaporated to obtain a thick extract. 20 grams of the thick extract was dissolved again in 70% ethanol, the filter was added until a clear phase was obtained. The resulting filtrate was added with 100 ml of chloroform and left for 48 hours. The chloroform fraction was fractionated three times until a clear fraction was obtained. The fractions obtained are then concentrated to produce a thick extract.

The test animals used were Sprague Dawley rats which were divided into five intervention groups with five rats randomly assigned to each group. The first group as a normal group was only given water, the second group as a negative control group was given 0.5% CMC-Na suspension, the third group as a positive control group was given captopril, the fourth group was given purified roselle calyx extract at a dose of 12.5 mg/kg BB, the fifth group was given a purified extract of roselle petals at a dose of 25 mg/kg BB. Samples of purified roselle calyx extract were given for 28 days.

The results obtained after 28 days showed that the blood pressure of the test animals decreased from 200.4 mmHg to 169 mmHg at a dose of 12.5 mg/kg BW. At a dose of 12.5 mg/kg BW, it can reduce systolic blood pressure in test animals, but the most effective results are giving a dose of 25 mg/kg BW because it has a more significant effect. After all, before being given the purified roselle calyx extract, the systolic blood pressure test animals was 199.2 mmHg to 146 mmHg. These results indicate that administering purified roselle extract to Sprague Dawley rats which had previously been conditioned for hypertension was active and effective. The purified extract of roselle petals is thought to contain the flavonoid compound quercetin which has an antihypertensive role because it can inhibit inflammation leading to vasodilation which causes increased blood pressure.

In research conducted by (Salem *et al*., 2022) compared the antihypertensive and cardioprotective potential of hot and cold liquid extracts from roselle petals. Extract 50 grams of roselle petals into powder for 25 grams of hot extraction and 25 grams of cold extraction. The results of hot extraction were 11.06 grams and the results of cold extraction were 10.19 grams. The extract was used for in vivo tests on rats that had induced hypertension. The test animals were divided into 7 intervention groups with 5 Wistar rats in each intervention group. The first group as the normal group was given saline for 8 weeks, the second group as the control group cold liquid extract was given a dose of 250 mg/kg/day, the third group as the control group the hot liquid extract given a dose of 250 mg/kg/day, the fourth group was the control group positive whose systolic blood pressure was increased, the fifth group as the standard group was given L-Name and captopril, the sixth group as the cold roselle petals extract group was given L-Name and hot roselle petals extract, the seventh group as the hot roselle petals extract group was given L-Name and hot extract of roselle petals.

The results showed that hot extracted roselle calyx extract was better in reducing systolic blood pressure and restoring normal heart histology compared to cold extract and captopril. Research on roselle petals carried out in vivo produced antihypertensive effects through reducing plasma ACE, angiotensin II, and aldosterone levels because roselle petals contain active compounds, namely anthocyanins.

In research conducted by (Sitorus *et al*., n.d.), they researched giving roselle petals to treat hypertension in pregnant women. There were 30 respondents divided into 2 groups, 15 people included in the control group and 15 people included in the intervention group. The intervention group was given a drink made from 10 grams of dried roselle petals which was brewed with 200 ml of hot water for 5 minutes and drunk when it was warm. Roselle's petal drink is given every day until blood pressure becomes normal. Respondents' blood pressure was measured before and after the intervention was given. For observation, blood pressure was measured every day after 6-8 hours of drinking roselle petals.

Giving roselle drinks is effective in treating hypertension in pregnant women, with the intervention group given roselle petals drinking showing more significant blood pressure reduction results. Initial blood pressure in the intervention group was 158.67/95 mmHg, decreasing to 119/73.33 mmHg. Blood pressure in the control group was 155.67/92 mmHg, decreasing to 120/75.33 mmHg. From these results, it can be seen that drinking roselle petals can significantly reduce blood pressure in pregnant women because the dried roselle petals drink contains flavonoid anthocyanin, gossypetin, and hibiscus glucoside as an ACE inhibitor.

Research conducted by Ubom *et al.*, (2022) examined the antihypertensive effect of anthocyanin compounds in roselle petals on Wistar rats. Roselle petals containing anthocyanin are used in doses of 50 mg, 100 mg, and 200 mg/kg BW. The test animals used were 35 Wistar rats divided into 7 groups with 5 Wistar rats in each group. The first group was the normal group, the second and third groups were the negative and positive hypertension groups without treatment and were given captopril 30 mg/kg, the fourth group was the treatment group given roselle petals at a dose of 50 mg/kgBW, the fifth group was the treatment group given roselle petals with a dose of 100 mg/kgBW, the sixth group was the treatment group given roselle petals at a dose of 200 mg/kgBW, the seventh group was given 100 mg/kgBW anthocyanin in roselle petals and 30 mg/kgBW captopril.

Anthocyanins have the possibility of being used as antihypertensives either in single doses or in combination with antihypertensive drugs. Treatment given to test animals showed that the anthocyanin compounds in roselle petals had almost the same effect on lowering blood pressure as captopril. The treatment group given the combination of captopril showed a more significant reduction compared to giving a single dose of roselle petals. The combination of roselle petals and captopril showed a synergistic interaction, the interaction that occurred acted as an ACE inhibitor.

In research conducted by (Shafyrani, 2007), they tested the antihypertensive activity of instant granules from a combination of extracts of roselle petals, chayote fruit (*Sechium edule J.*) and aloe vera leaves (*Aloe vera L)*. The research was tested on 20 white rats which were grouped into 5 groups with each group containing 4 white rats which would be given different treatments. The first group was the positive control group, the second group was the negative control group, the third group was the treatment group with dose I of 0.5 g/200 g BW, the fourth group was the treatment group with dose II of 0.75 g/200 g BW and the fifth group was the treatment group with dose III of 1 g/200 g BW.

Of the 5 treatment groups, the most significant reduction in blood pressure occurred in the group given a dose of 0.5 g/200 g BW. The average reduction in blood pressure at dose I was 51.61/41.68 mmHg.

The activity reduced systolic blood pressure by 30.27% and reduced diastolic blood pressure by 31.86%. The results of this study showed that the combination of roselle calyx extract, chayote fruit, and aloe vera leaves were most effective in lowering blood pressure at a dose of 0.5 g/200 g BW. The anthocyanin compound in roselle petals which interacts synergistically with chayote fruit and aloe vera leaves plays a role in lowering blood pressure

and reducing plasma ACE. The research results are presented in the form of pictures, graphs, and tables according to the specified format. The tables and figures presented must be cited/mentioned.

CONCLUSION

Scientifically, roselle petals can be used as an antihypertensive herbal plant. The similarity in this study was that the main compounds in roselle petals in this study are quercetin and anthocyanin compounds which are included in the group of flavonoid compounds in roselle petals as antihypertensives. The difference in this research was that the benefits of roselle petals are not only antihypertensive by lowering blood pressure which works through a mechanism of inhibiting inflammation leading to vasodilation which causes increased blood pressure and functions as an ACE inhibitor, roselle petals were also useful in lowering the pulse rate and as an antioxidant.

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