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ORIGINAL RESEARCH

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## ROSELLE FLOWER (*HIBISCUS SABDARIFFA*) IN THE TREATMENT OF HYPERTENSION IN POSTPARTUM MOTHERS

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### ABSTRACT

**Background:** Roselle flower (*Hibiscus sabdariffa*) has been used as a food and herbal drinks, in hot and cold beverages, as an herbal medicine.

**Objective:** To examine the effect of consuming roselle dried flower petals on changes in maternal hypertensive blood pressure during postpartum period.

**Methods:** This was a quasi-experimental study with non-equivalent control group design conducted in 2016. There were 30 samples recruited using consecutive sampling with 15 samples in an intervention group and a control group. Data were analyzed using paired t-test to know the difference of blood pressure value before and after intervention in the intervention and control group, and independent t-test to determine the difference of blood pressure decrease between intervention and control group. Mann-Whitney and Wilcoxon test were also conducted for data analysis.

**Results:** Findings showed that there were statistically significant differences in systolic and diastolic blood pressure values before and after intervention in the intervention and the control group with p-value 0.000 (<0.05) with systolic blood pressure decrease was 5 mmHg and diastolic was 5.33 mmHg. Additionally, there was a significant effect in the duration of healing in the intervention group with p-value 0.000 (<0.05), with the average duration of healing was 2 days.

**Conclusion:** There were significant effects of dried petals of rosella flowers (*Hibiscus sabdariffa*) brewed with 200 ml of hot water with temperature 90°C in lowering blood pressure, and there were significant differences in systolic and diastolic blood pressure and duration of healing between the intervention group and the control group of mothers who consumed antihypertensive drugs. The results of this study can be applied by midwives in postpartum care with the cases of hypertension. It is expected that this intervention can help the healing process more quickly through a combination of antihypertensive medicines and sedated petals of rosella flowers.

**Keywords:** rosella flowers, blood pressure, postpartum hypertension, *Hibiscus sabdariffa*

## INTRODUCTION

The postpartum period is the period that begins since the placenta is born until the uterus returns as it was before pregnancy.<sup>1</sup> Immediately after delivery, many women have high blood pressure that is at risk of puerperal hypertension.<sup>1</sup> Postpartum hypertension is an increase in blood pressure  $\geq 140/90$  mmHg with or without proteinuria or edema.<sup>2</sup> Normally, women who have hypertension during pregnancy can become normotensive rapidly after birth, but hypertension may present in the first week of postnatal period. The incidence of postpartum hypertension is 5 to 10% of other postpartum pathology cases.<sup>2</sup>

By 2013 it is more than 25% of maternal deaths in Indonesia due to hypertension.<sup>3</sup> Study explained that the determinants of maternal mortality during the puerperium period are preeclampsia/eclampsia and complications of labor.<sup>4</sup> Mothers with preeclampsia/eclampsia had an increased risk of maternal mortality during childbirth 37.27 times greater than mothers without preeclampsia/eclampsia.<sup>4</sup>

Based on a preliminary study conducted at the General Hospital of Semarang from January to September 2016, it was indicated that there were 12.34% of cases of hypertension during pregnancy until postpartum period. In the General Hospital of Ambarawa, there were 16.14% of cases, and in Ungaran hospital there were 13.01% of cases of hypertension during pregnancy until postnatal period.

Complications caused by postpartum hypertension include blood vessel damage, heart problems, retinal injuries, kidney failure, stroke, cerebral hemorrhage, pulmonary edema, eye abnormalities, liver necrosis, and kidney abnormalities.<sup>5,6</sup> Treatment of hypertension aims to prevent the occurrence of complications through pharmacological

and non-pharmacological medicine. The pharmacological way is performed by administering antihypertensive chemical drugs such as diuretics, beta-blockers, ace-inhibitors and ca blockers, whereas non-pharmacologic methods are performed by giving natural ingredients with minimal negative effects or commonly referred to complementary therapies.

The choice of pharmacological drugs for each patient with hypertension depends on the metabolic and subjective side effects. The decision on the use of drugs always involves consideration of benefits and risks. Some examples of side effects caused in hypertensive patients who consume antihypertensive drugs are fluid and sodium resistance, hypokalemia, hypomagnesia, hypercalcemia, hyperuricemia, hyperglycemia, hyperlipidemia, and sexual dysfunction.<sup>6</sup> Thus, minimizing treatment in terms of drug insecurity is needed to improve the quality of life of patients with minimal risk, which can be done through non-pharmacological efforts.

The National Center of Complementary and Alternative Medicine of the National Institute of Health classifies various therapies and treatments into 5 categories, one of which is Biological Based Therapies (BBT), a type of complementary therapy using natural ingredients.<sup>7</sup> Treatment with natural ingredients that are economical and minimal negative effects is a good solution to overcome health problems. One of the medicinal plants made from natural for hypertension is dried petals of roselle flowers (*Hibiscus sabdariffa* L.). It has been used traditionally as a food, in herbal drinks, in hot and cold beverages, as a flavoring agent in the food industry and as a herbal medicine.<sup>8</sup>

The common mechanism of this medicinal plant is to control blood pressure through dilated blood vessel effects and decrease the kidney's ability to

increase blood pressure.<sup>9</sup> The flavonoid compounds contained within the roselle flower are composed of anthocyanin, gassypetin, and glucoside hibiscin, working directly on the smooth muscle of the arteries, which is stimulating or activating endothelium-driven relaxing factor (EDRF) that cause vasodilation and inhibit angiotensin converting enzyme (ACE) and prevent the formation of angiotensin II, and maintain Nitric Oxide Synthase (NOS) as a strong vasodilation.<sup>10</sup> Herrera and Arellano's research in Phytomedicine stated that hypertensive patients who drank 10 grams of sedated roselle petals daily can control mild to moderate hypertension as effectively as captopril.<sup>11</sup> Therefore, with all the benefits of roselle flower, this study aimed to examine the effect of dried petals of rosella flowers (*Hibiscus sabdariffa* L.) in lowering blood pressure in postpartum mothers who consumed antihypertensive drugs.

## METHODS

### *Design*

This was a quasi-experimental study with non-equivalent control group design. This research was conducted in October-December 2016 in three hospitals, namely the General hospitals of Ambarawa, Ungaran and Semarang.

### *Population and sample*

The population in this study were all postpartum women who experienced hypertension. The inclusion criteria of the samples were postpartum mothers in a state of consciousness (composmentis), and willing to be a research respondent. The exclusion criteria were postpartum mothers who had diabetes mellitus, kidney, hyperlipidemia, gastritis, and any other complications. There were 30 respondents recruited by consecutive sampling with 15 respondents assigned in the intervention group and the control

group. Lemeshow formula<sup>12</sup> was used to calculate the sample size for unknown number of population in this study.

### *Intervention*

Both intervention and control groups in this study received antihypertensive medication according to the conditions and therapy received from the hospitals. Types of antihypertensive drugs consumed by respondents in this study were 10 grams nifedipine, 5 mg amlodipine, and 125 mg methyldopa. For the intervention group, rosella dried flower petals were given with dose of 10 grams brewed with 200 ml of hot water with temperature 90°C, and silenced for 5 minutes then filtered and drunk by the respondent once daily in the morning after 3 hours of respondents taking antihypertensive drugs.

### *Instruments*

The instrument used for measuring the systolic and diastolic blood pressure values was a set of stethoscope and mercury tensiometer. The tool used is a new tool, and has been validated through the calibration process of research tools.

### *Data collection*

This study was conducted in the General hospitals of Semarang, Ambarawa, and Ungaran Hospital. Interventions were performed by the researchers and enumerators until the value of the respondent's blood pressure in both groups returned to normal. The data collection was performed by the researchers and assisted by enumerators. There were 9 enumerators were prepared and trained to achieve the objective of this study. They were midwives with Diploma III and IV background with at least 2 years of clinical experiences. The examination of blood pressure was performed after 3 hours giving of dried rose petals of rosella. For the control

group, the intervention was performed by health workers in the settings of the study, whereas the researcher or enumerator only monitored and recorded the results of antihypertensive drug administration. After 6 hours of antihypertensive treatment, the researchers or enumerators checked the blood pressure value, and monitoring was performed until the blood pressure value returns to normal.

#### *Data analysis*

Data were analyzed using paired t-test to know the difference of blood pressure value before and after intervention in the intervention and control group, and Independent t-test to determine the difference of blood pressure decrease between intervention and control group. Mann-Whitney and Wilcoxon test were also performed for non-normal data distribution.

#### *Ethical consideration*

During the research process, researchers payed attention to the ethics of research by fulfilling four basic human rights in this study, namely giving full decision to

the respondents to decide willing or not to be respondents in this research, keeping confidential data and information obtained and only used for research purposes, keeping the identity of the respondents by only displaying the initial name in the research and the researchers minimized the risks and actions given to the respondents, as well as providing full physical, emotional and environmental comfort. This study has been approved by the Health Research Ethics Committee (K.EP.K) of Health Polytechnic of Ministry of health (Poltekkes) of Semarang. It was also stated that the participants have obtained the appropriate informed consent in this study.

## **RESULTS**

The majority of respondents as shown in the Table 1 were in the 20-35 age group (63%), with multipara parity (70%), and normal delivery type (70%). There were 53.3% of the respondents had pre-eclampsia history and complications history (53.3%). Some of them had history of normal childbirth (60%), and no family history of hypertension (53.3%).

**Table 1** Characteristics of Respondents (N = 30)

Characteristics of respondents	Intervention group		Control group		Total	
	Total	%	Total	%	Total	%
<b><u>Age</u></b>						
< 20 years	3	75%	1	25%	4	13%
20-35 years	8	42.1%	11	57.9%	19	63%
>35 years	4	57.1%	3	42.9%	7	23%
<b><u>Parity</u></b>						
Primipara	4	50%	4	50%	8	26.7%
Multipara	10	47.6%	11	52.4%	21	70%
Grande multipara	1	100%	0	0	1	3.3%
<b><u>Kind of delivery</u></b>						
Normal	9	42.9%	12	57.1%	21	70%
<i>Sectio Caesarea</i>	6	66.7%	3	33.3%	9	30%
<b><u>Pregnancy history</u></b>						
PER	5	55.6%	4	44.4%	9	30%
PEB	9	56.2%	7	43.8%	16	53.3%
Eclampsia	0	0	0	0	0	0
Normal	1	20%	4	80%	5	16,7%
<b><u>Delivery history</u></b>						
Complication	10	62.5%	6	37.5%	16	53.3%
No complication	5	35.7%	9	64.3%	14	46.7%

Characteristics of respondents	Intervention group		Control group		Total	
	Total	%	Total	%	Total	%
<b><u>Previous postpartum history</u></b>						
h	2	28.6%	5	71.4%	7	23.3%
Mild preeclampsia	4	80%	1	20%	5	16.7%
Severe preeclampsia	0	0	0	0	0	0
Eclampsia	9	50%	9	50%	18	60%
Normal						
<b><u>Family history</u></b>	9	64.3%	5	35.7%	14	46.7%
Yes	6	37.5%	10	62.5%	16	53.3%
No						

**Table 2** Homogeneity of characteristics of the respondents

Variables	Mean±SD	p-value
Age (years)	20-35 ± 0.607	0.343
Parity	Multipara ± 0.504	0.737
Kind of delivery	Normal ± 0.466	0.029
Pregnancy history	Mild preeclampsia ± 0.999	0.88
Delivery history	Normal ± 0.507	0.478
Previous postpartum history	Severe preeclampsia ± 1.326	0.097
Family history	No ± 0.507	0.478

It is considered homogenic if the p-value is > 0.05, and Table 2 shows that the variables of age, parity, pregnancy history, delivery history, previous

postpartum history, and family history were homogenous, while the variable of kind of delivery was not homogenic.

**Table 3** Normality test in the intervention and control group

Group	Mean	SD	P-value
<b>Intervention group</b>			
Systolic before	158.67	14.573	0.375
Systolic after	119	6.036	0.140
Systolic difference	39.67	11.255	0.978
Diastolic before	95	7.071	0.011
Diastolic after	73.33	7.715	0.191
Diastolic difference	21.67	9.759	0.445
Healing period	2.00	0.756	0.001
<b>Control group</b>			
Systolic before	155.67	12.743	0.219
Systolic after	120	5.669	0.171
Systolic difference	34.67	8.338	0.853
Diastolic before	92.33	5.627	0.113
Diastolic after	75.33	5.164	0.293
Diastolic difference	17.00	6.761	0.038
Healing period	3.53	0.990	0.061

Table 3 shows that all data in the intervention group were in normal distribution (> 0.05), except diastolic before intervention and duration of healing were not normally distributed (<0.05), then paired t-test was performed for analyzing systolic blood pressure, and

Wilcoxon test for diastolic blood pressure. In the control group, all data were normally distributed, except diastolic difference, thus paired t-test was used to analyze systolic and diastolic blood pressure.

Based on the normality of data shown in the two groups, the data analysis for systolic blood pressure between the two groups used independent t-test, while the

diastolic blood pressure data between the two groups used the Mann-Whitney test. The duration of healing was also analyzed by the Mann-Whitney test.

**Table 4** Difference of systolic and diastolic before and after intervention

Group	Blood pressure	t	Mean±SD	p-value
Intervention group	Systolic	13.65	39.67±11.25	0.000
	Diastolic	10.27	22.33±8.42	0.000
Control group	Systolic	16.10	34.67±8.33	0.000
	Diastolic	9.73	17±6.76	0.000

Based on Table 4, it can be said that there were statistically significant differences in systolic and diastolic blood pressure values before and after intervention in the intervention group with p-value 0.000 (<0.05) with mean of systolic blood pressure decrease was 39.67 mmHg and

diastolic was 22.33 mmHg. The same thing also happened in the control group data that there were significant differences in systolic and diastolic blood pressure with p-value 0.000 (<0.05), and mean of systolic blood pressure decrease was 34.67 mmHg and diastolic was 17 mmHg.

**Table 5** Difference in blood pressure decrease between the intervention and control group

Variable	Intervention (n <sub>1</sub> =15)	Control (n <sub>2</sub> =15)	Difference (n <sub>1</sub> -n <sub>2</sub> )	p-value
Systolic	39.67	34.67	5	0.178
Diastolic	22.33	17	5.33	0.066

Table 5 shows that there was a difference in systolic blood pressure between both groups was 5 mmHg and diastolic 5.33 mmHg. However, these values were not

significantly different with p-value of systolic blood pressure was 0.178 and diastolic was 0.066 (> 0.05).

**Table 6** Difference in healing duration between the intervention and control group

Variable	Intervention (n <sub>1</sub> = 15)	Control (n <sub>2</sub> = 15)	Difference (n <sub>1</sub> -n <sub>2</sub> )	p-value
Healing duration	2.00 (2 days)	3.53 (3-4 days)	1.53 (1-2 days)	0.000

As shown in the Table 6, it can be concluded that there was a significant difference in the duration of healing between the intervention and control group with p-value 0.000 (<0.05), with the average duration of healing in the intervention group was 2 days while in the control group was 3-4 days.

## DISCUSSION

Findings in this study showed that there were significant differences in blood pressure both in systolic and diastolic,

which was consistent with the previous study stated that there was a significant difference in mean of the value of systolic and diastolic blood pressure before and after intervention in the respondents who were given the addition of roselle dried flower petals with antihypertensive therapy.<sup>13</sup> Similar with the study, which also examined antihypertensive effects that were notable subsequent to treatment with dried extract of calyx (250 mg) for 4 weeks in patients with stage 1 or 2 hypertension. Indeed, a drop of blood



pressure from 146.48/97.77–129.89/85.96 mmHg was noticed.<sup>14</sup> This however proved that the flavonoid compounds in the roselle dried flower petals were effective in lowering blood pressure, which are working directly on the smooth muscle of the arteries, stimulating or activating endothelium-driven relaxing factor (EDRF) that cause vasodilation and inhibit angiotensin converting enzyme (ACE) and prevent the formation of angiotensin II, and maintain Nitric Oxide Synthase (NOS) as a strong vasodilation.<sup>10</sup> In addition, this study revealed that there was a statistically significant difference in the duration of healing between the intervention and control group.

However, the mean difference between both groups in this study were not statistically significant (see Table 5). There are two factors that could explain this result: first, period of the intervention in this study dependent on the duration of healing from each study respondent, and the second was the observation of blood pressure values was done every day after 3 hours of the intervention, and posttest value in both groups was determined from the final measurement of blood pressure value after the respondent declared cured or blood pressure value was back to normal, so the frequency of posttest blood pressure value between the two groups was not much different or could be said the same.

#### *Limitation of the study*

The limitations of this study were that the researchers could not do sample selection to control the psychological factors that inhibit the process of decreasing blood pressure that affects the production of hormones in the body, and the researchers did not control the type of antihypertensive drugs consumed by the respondents due to limited time. In addition, activities or

mobilization and food consumed by respondents could not be fully controlled by researchers because the observations made were not 24 hours.

## CONCLUSION

It could be concluded that there were significant effects of dried petals of rosella flowers (*Hibiscus sabdariffa* L.) in lowering blood pressure, and there were significant differences in systolic and diastolic blood pressure and duration of healing between the intervention and control group of mothers who consumed antihypertensive drugs. The results of this study can be applied by midwives or health services in postpartum care with the cases of hypertension. It is expected that this intervention can help the healing process more quickly through a combination of antihypertensive medicines and sedated petals of rosella flowers, so that postpartum women with hypertension do not take pharmacological drugs for long time, and complications arising from untreated puerperal hypertension quickly can be avoided. Further studies are needed to analyze blood pressure values in respondents who are given antihypertensive drugs of the same type, and to add a hormonal check parameter that plays a direct role in the process of increasing blood pressure to strengthen the existing hypothesis.

#### Declaration of Conflicting Interest

None declared.

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#### Authorship Contribution

Authors equally contributed in this study.

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