The Effectiveness of Red Ginger Water Bath to Reduce Blood Pressure of Pregnant Women with Preeclampsia

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ABSTRACT

Pre-eclampsia is pregnant women with pre-eclampsia at gestational age > 20 weeks, urine protein levels ≥30 mg per 24 hours, and systolic blood pressure >140 mmHg or diastolic blood pressure ≥90 mmHg. Pre-Eclampsia could begin in the antenatal, intrapartum, or postpartum period. Management of pre-eclampsia generally aims to avoid eclampsia and stop the injury/trauma to the mother and fetus, the birth of the baby who can grow and develop normally, and the full recovery of the mother's health. Management of pre-eclampsia can be pharmacological and non-pharmacological. This study aimed to determine whether giving foot soak therapy using red ginger water decoction affects reducing blood pressure in pregnant women with pre-eclampsia. The design of this study was quasi-experimental with a pre-test and post-test design. This study used a non-probability sampling technique with a purposive sampling method of 40 respondents. Soaking feet using boiled red ginger water implemented for 2 weeks. In the analysis of data, the Mann-Whitney test was used. The results showed that most respondents were 31-40 years old, had higher education, were employed (55%), and were on Gravida III. Most respondents had a medical history of hypertension in both the control and intervention groups. The results of the Mann-Whitney test for systolic pressure, p-value 0.000 (<0.05), meaning that there is an effect of giving foot soak therapy with red ginger decoction on blood pressure in pregnant women with pre-eclampsia.
Keywords: preeclampsia; blood pressure; pregnant women

INTRODUCTION

Indonesia ranks 7th in The maternal mortality rate in East Asia per 100,000 live births in 2017 (126), after Nepal (258), Timor Leste (215), Myanmar (178), Bangladesh (176), India (174), Bhutan (148). The mortality rate of Indonesia children <5 years old per 1,000 live births in 2016 for the East Asia region is ranked 7th (50.8) after Myanmar, Timor Leste, India, Nepal, Bangladesh, and Bhutan. In Indonesia itself, based on the Indonesian Demographic and Health Survey (IDHS) in 2017, the neonatal mortality rate (AKN) decreased from 2012, from 15 per 1,000 live births to 24 per 1,000 live births. The 5-year-old mortality rate (AKBA) is 32 per 1,000 live births. According to WHO, death during pregnancy or within 42 days after the termination is the result of all causes related to or aggravated by the pregnancy or its management, but not due to accident/injury. [1]

The cause of maternal death in the Kepulauan Riau Province in 2019 was bleeding 33%, hypertension in pregnancy 31%, circulatory system disorders 8%, and other diseases 28%. Pre-eclampsia is a pregnancy-specific condition that occurs after 20 weeks of gestation in previously normotensive women. This condition is characterized by an increase in blood pressure (140/90 mmHg) accompanied by proteinuria.[2] he most severe complication of pre-eclampsia is the mother's and fetus's death. However, it causes other complications such as placental abruption, premature birth, eclampsia, hypofibrinogenemia, hemolysis, brain hemorrhage, eye disorders, birth pulmonary edema, liver necrosis, kidney disorders, seizures, aspiration pneumonia and Disseminated Intravascular Coagulation (DIC). [3]

Management of pre-eclampsia generally aims to avoid eclampsia and stop the injury/trauma to the mother and fetus, the birth of the baby who can grow and develop normally, and the full recovery of the mother's health. Management of pre-eclampsia can be pharmacological and non-pharmacological. Currently, numerous complementary therapies are used to reduce the side effects of drugs, including warm water soak therapy by Christina, Machcepat, and Mamat in 2015. There are differences in blood pressure in pregnant women with pre-eclampsia before and after being given a foot soak with warm water. This is in line with research conducted by Nimas, A. and Nikmatul, K. (2019) that foot soak with red ginger affects blood pressure in pregnant women with pre-eclampsia in the working area of Mranggen and Karangawen Health Centers. [4]

Complementary therapy that can be done independently is foot soak (foot hydrotherapy). Soaking the feet in red ginger decoction will increase circulation and cause a systemic response due to the dilation of blood vessels (vasodilation). A foot soak can also be combined with other herbal ingredients. To distinguish it from previous

research, this study only used ginger water. [5] Red Ginger contains essential oils that will give the effect of a warm sensation and spicy smell so that blood vessels become wide and blood flow becomes smooth. The type of ginger that is often used for medicine is red ginger. Many believe that red ginger contains high essential oil (2.5%). The sharp aroma and spicy taste have better properties than other subspecies. [6]

This study aimed to measure the effectiveness of red ginger decoction foot soaks in reducing blood pressure in pre-eclampsia pregnant women at Batu X Tanjungpinang Health Center, Kepulauan Riau.

METHODS

This study used a quantitative method with a quasi-experimental pre-test and post-test design. The purpose of the pre-test and post-test design was to determine the effect of giving red ginger decoction foot soaks for two weeks on changes in blood pressure in pregnant women with pre-eclampsia. This method implemented in the working area of Batu X Tanjungpinang Health Center, Kepulauan Riau. The data analysis was done by descriptive analysis and comparative analysis. Statistical tests were done with paired sample t-test and the Mann-Whitney test to determine and analyze the differences in systolic blood pressure in each group.

RESULTS

Data collecting in this study started from September – November 2021. The study took place in the working area of the Batu X Tanjungpinang Health Center. This research uses a Quasi-Experimental with Pre-test and Post-test designs. The data were taken in the form of demographic data and blood pressure. The respondents in this study were pre-eclampsia pregnant women in the Batu X Tanjungpinang Health Center, consisting of 40 people, divided into two groups; 20 in the intervention group and 20 in the control group.

Table 1. Distribution of respondents' characteristics

Characteristics	Intervention (n = 20)		Control (n= 20)	
	Frequency	Percentage	Frequency	Percentage
Age:				
20-30	5	25	6	30
31-40	12	60	11	55
>41	3	15	3	15
Job: _				
Employed	11	55	11	55
Unemployed	9	45	9	45
Level of education:				
Lower	8	40	9	45
Higher	12	60	11	55
Gravida:				
G1	3	15	4	20
G2	6	30	5	25
G3	7	35	7	35
G4	2	10	3	15
G5	2	10	1	5
History of hypertension:				
Yes	12	60	10	50
Not	8	40	10	50

Table 1 shows that the majority of respondents aged 31-40 years, 12 people (60%) in the intervention group and 11 people (55%) in the control group. Most of the respondents in the intervention and control groups were employed (55%). On the education characteristic, most respondents had a higher level of education; 12 people (60%) in the intervention group and 11 people (55%) in the control group. For parity characteristic, the average was in the 3rd Gravida; 7 people (35%) for both the intervention and control groups. As for the history of hypertension, most respondents had a history of hypertension, 12 people (60%) in the intervention group and 10 people (50%) in the control group.

Table 2. Blood pressure before giving foot soak with red ginger water decoction

Group	Variable	Mean	SD	Median	Min-Max
Intervention	Systolic pretest	145.82	2,786	146.00	140-150
	Diastolic posttest	105.00	3,661	105.00	100-110
Control	Systolic pretest	142.82	3.093	142.00	140-148
	Diastolic posttest	103.91	3,885	104.00	100-110

Table 2 shows that the mean systolic blood pressure in the intervention group in the pretest was 145.82 mmHg and in the control group was 142.82 mmHg, while in the intervention group, the mean posttest of diastolic blood pressure was 105.00 mmHg and in the control group was 103.91 mmHg. In the intervention group, the minimum value for systolic blood pressure in the pre-test was 140 mmHg, and the maximum value for the pre-test was 150. The minimum value of diastolic in the pre-test was 100 mmHg, and the maximum for systolic blood pressure was 110 mmHg. While in the control group, the minimum value of pretest systolic blood pressure was 140 mmHg, and the maximum value was 148. Furthermore, the minimum value for the control group in the diastolic posttest is 100 mmHg, and the maximum is 110 mmHg.

Table 3. Blood pressure after giving foot soak with red ginger water decoction

Group	Variable	Mean	SD	Median	Min-Max
Intervention	Posttest Systolic 1	136.27	3,467	138.00	129-140
	Posttest Systolic 2	124.82	3,894	123.00	120-130
	Posttest Diastolic 1	101.09	1,446	101.00	99-104
	Posttest Diastolic 2	98.73	3,636	99.00	90-105
Control	Posttest Systolic 1	139.27	3,003	138.00	1 36 -145
	Posttest Systolic 2	135.55	3.012	135.00	132-142
	Posttest Diastolic 1	102.64	3.139	102.00	99-108
	Posttest Diastolic 2	100.82	2,714	100.00	97-106

Table 3 shows that the mean in the intervention group posttest systolic blood pressure in the first week was 136.27 mmHg, and in the second week was 124.82 mmHg. In the intervention group, the mean diastolic blood pressure in the first week was 101.09 mmHg and in the second week was 98.72 mmHg. Meanwhile, in the control group, the posttest systolic blood pressure in the first week was 139.27 mmHg; and 135.55 mmHg In the second week. The mean post-test diastolic blood pressure in the first week was 102.64 mmHg and the second week was 100.82 mmHg.

Table 4. Analysis of changes in systolic blood pressure before (pre), after giving red ginger soak

Variable	Group	p
Pretest-Posttest 1	Intervention	0.000
	Control	0.000
Pretest-Posttest 2	Intervention	0.000
	Control	0.000

Table 4 shows the paired sample t-test of systolic blood pressure getting a p-value of 0.000 in the intervention and control groups. P-value <0.05 means that there was a significant change in blood pressure in both the intervention group and the control group in the first and second week.

Table 5. Analysis of changes in diastolic blood pressure before (pre), after giving red ginger soak

Variable	Group	p
Pretest-Posttest 1	Intervention	0.002
	Control	0.008
Pretest-Posttest 2	Intervention	0.002
	Control	0.001

Based on table 5, the paired sample t-test of diastolic blood pressure before giving red ginger soak. In the first week, the intervention group got a p-value of 0.002, and the control group with a p-value of 0.008. In the second week, the p-value for the intervention group was 0.002, and for the control group was 0.001. The data shows that both the intervention group and the control group got a p-value <0.05, meaning there was a significant change in systolic blood pressure before and after giving foot soaks with red ginger decoction from the first and second week.

Table 6. The results of the analysis of differences in blood pressure in the intervention group and control group after 2 weeks

Variable	n	Mean	Median	Min- Max	p
Systolic posttest 1st week	40	120.18	120.00	99-145	0.000
Diastolic posttest 1st week	40	101.86	101.50	99-108	0.343
Systolic posttest 2nd week	40	130.18	131.00	120-142	0.000
Diastolic posttest 2nd week	40	99.77	99.50	90-106	0.172

Table 6 shows the results of the Mann-Whitney test for systolic blood pressure in the first and second week on giving foot soaking with red ginger water decoction was p = 0.000. Since the p-value showed < 0.05, statistically, there was a significant change in systolic blood pressure before and after giving the foot soak with red ginger decoction in the first and second week. In addition, the results of the Mann-Whitney test of systolic and diastolic blood pressure after the first and second week of giving a foot soak with red ginger water decoction was p = 0.343 for the intervention group and p = 0.172 for the control group. Because the p-value showed > 0.05, statistically, there was no significant difference in blood pressure in the intervention and control groups 2 weeks after giving the foot soak with the red ginger decoction. However, clinically there were significant differences between groups.

DISCUSSION

The results of the univariate analysis showed that more than half of the respondents were aged 31-40 years in both the intervention group and the control group. This is in line with research conducted by Rohmani, et al (2013) that maternal age is the most dominant risk factor influencing the incidence of pre-eclampsia in pregnancy (P 0.003). Likewise, research conducted by Basri, et al (2018), found that the characteristics of pregnant women with hypertension and pre-eclampsia are high-risk pregnancy ages, namely < 20 years and > 35 years (p 0.000). [7] Other research that supports this is according to Setyawati (2013), that hypertension and the occurrence of pre-eclampsia in pregnant women are mainly due to age > 30 years. [8]

More than half of the respondents were highly educated in both the intervention and control groups. According to Padila (2019), education influences a person's ability to obtain and use health information. Education influence a person's understanding of the importance of healthy lifestyle choices. A person's level of education influences decision-making about health problems. The lower the mother's education level, the less likely she is to use health care facilities. Mothers with higher education and who work in the formal sector have greater access to health information, are more involved in determining attitudes, and are more independent in nursing actions. This is in line with research conducted by Basri, et al (2018) that there is no relationship between the incidence of hypertension in pregnancy and education level (P 0.615). [7]

More than half of the respondents are employed in the intervention and control groups. This is in line with research by Khuzaiyah, Anies and Sri (2016), which showed that respondents with pre-eclampsia worked the most, as many as 16 people (50%). This is supported by Andriyani (2012) research, which shows a significant relationship between work and pre-eclampsia with a p-value of 0.001. According to research by Nurhasanah and Indriani (2017), Preeclampsia can be caused by the mother's work factor. Mothers who work outside the home are more likely to experience pre-eclampsia than housewives. Physical activity and work-related stress. Stress on a person's body can increase endothelial release in blood vessels, resulting in vasoconstriction and pre-eclampsia. Besides, stress causes the adrenal glands to secrete adrenaline. The hormone adrenaline stimulates a faster heart rate, which causes an increase in blood pressure, which leads to pre-eclampsia. [8]

The average pregnancy of respondents was in the 3rd Gravida for both the intervention and control groups. According to research by Yanuarini, Suwoyo and Tinta (2020), pregnancy status is one of the risk factors for pre-

eclampsia in pregnant women. Pre-eclampsia is three times more likely to occur in the first pregnancy. This is due to the imperfect development of blocking antibodies against placental antigens, resulting in an unfavorable immune response to placental histocompatibility, which affects blood pressure and causes pre-eclampsia. According to research conducted by Sinambela and Sari (2018), parity affects hypertension and the incidence of pre-eclampsia in pregnancy. In contrast to research by Rohmani et al (2013), there is no relationship between gravidity and the incidence of hypertension and pre-eclampsia in pregnancy (p 0.077). More than half of the respondents had a history of hypertension in either the intervention group or the control group; hence they have a more significant risk factor for pre-eclampsia. [8]

Complementary therapy that can be done independently is foot soak (foot hydrotherapy). Soaking the feet in warm water will increase circulation and cause a systemic response due to the dilation of blood vessels (vasodilation). [9] Soaking feet can also be combined with other herbal ingredients. One of the herbal ingredients that can be combined with a foot soak is ginger. Ginger contains essential oils that will give the effect of a warm taste and spicy smell so that blood vessels become wide and blood flow becomes smooth. [10] The type of ginger that is often used for medicine is red ginger. Many believe that red ginger contains a high essential oil (2.5%). The sharp aroma and spicy taste have better benefits than other subspecies. [6]

Based on the results of bivariate analysis, the decrease in systolic blood pressure in the intervention group for the first and second week showed a P-value = 0.000. Because the P-value <0.05, statistically, there was a significant change in systolic blood pressure before and after giving the foot soak with red ginger water boiled. Soaking the feet with red ginger decoction has the effect of increasing blood circulation and increasing muscle relaxation in the body. Red ginger has the most significant benefits compared to other types of ginger. The compound states that gingerols have been shown to have hypotensive activity. The content of gingerol comes from non-volatile oil, as previously described. This content is what makes the sensation of a warm feeling on the skin when used topically. [11]

During pregnancy, there is a risk of experiencing health problems such as pre-eclampsia. Foot soak therapy with a red ginger decoction is one of the relaxation techniques that can reduce pre-eclampsia. This therapy is done by soaking the feet in warm water containing boiled red ginger. Soaking the feet in warm water with red ginger produces a hot/warm effect that can cause liquids, solids, and gases to expand in all directions and increase chemical reactions. In the tissues, metabolism will occur along with increased exchange between body chemicals and body fluids. Heat/warm has a biological function that causes blood vessels to dilate, so blood circulation increases. Physiologically, the body's response to heat is to dilate blood vessels and relax muscles to increase circulation, which will affect blood pressure. [5]

Red ginger has many advantages compared to other gingers, especially in terms of the content of chemical compounds in the rhizome. Red ginger is more widely used as a medicinal raw material. Red ginger has a sharp aroma and a very spicy taste. The essential oil content in red ginger is higher than in other ginger. [12]

Based on the results of bivariate analysis, it showed that the decrease in diastolic blood pressure in the intervention group which given foot soaks with boiled red ginger water for the first week and the second week showed a P-value = 0.343 for the first week and P = 0.172 for the second week. Because P value> 0.05, statistically, there was no significant change in systolic blood pressure before and after giving the foot soak with red ginger water decoction. The results of the analysis above are associated with various inhibiting or confounding factors in the study, including age, parity/gravida, occupation, weight, history of hypertension, and diet/lifestyle.

CONCLUSION

There is the effectiveness of reducing systolic blood pressure in the intervention group that gave foot soak with red ginger water decoction for the first week and the second week. Soaking the feet with red ginger decoction has the effect of increasing blood circulation and increasing muscle relaxation in the body.

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