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Combining Prenatal Yoga and Self-Hypnosis as Effective Intervention to Reduce Blood Pressure of Pre-Eclampsia Pregnant Women

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Abstract

Pre-eclampsia (PE) is a significant cause of maternal and fetal morbidity and mortality. PE requires intervention to prevent it from developing into severe pre-eclampsia or eclampsia. One of the non-pharmacological therapies for PE that has not been widely used is prenatal yoga and self-hypnosis. This research aimed to determine the effect of combining prenatal yoga and self-hypnosis on decreasing blood pressure in pregnant women with PE. The method was *quasi-experimental, with a pretest-posttest and a control group design*. The population was all pregnant women with PE in 5 health centers in Bangkalan district from May to August 2024. The sampling technique used *simple random sampling* with the *Federer* formula, with a total sample of 32 people, 16 in each group. The research instruments used calibrated digital tension meters and SOPs for prenatal yoga and self-hypnosis. The results of the *Wilcoxon analysis test* showed that prenatal yoga and self-hypnosis effectively reduced blood pressure in pregnant women with pre-eclampsia with a p-value of 0.000 ($p < 0.05$). Yoga and self-hypnosis are effective in lowering blood pressure by increasing the physical, mental, and spiritual strength of the mother in dealing with pregnancy with PE. Yoga practices integrated with self-hypnosis techniques can be done by every normal pregnant woman or pregnant woman who experiences pre-eclampsia to manage blood pressure to be at a normal blood pressure level.

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INTRODUCTION

Pre-eclampsia, superimpose pre-eclampsia, gestational hypertension, and chronic hypertension affect 5-10% of pregnancies worldwide (Bisson et al., 2023; Garovic et al., 2022; Portelli & Baron, 2018; Smith et al., 2020; Zhang et al., 2020) and become the main killer of mothers and babies worldwide (Stefanovic, 2023). Pre-eclampsia is estimated to be seven times higher in developing countries (Malik et al., 2019). The incidence of pre-eclampsia in Indonesia is quite high. The research conducted by Kurniasih et al. at Prof. Dr. Margono Soekarjo Purwokerto Hospital from 2019 to 2023 shows that 4,547 (48.96%) pregnant women presented with pre-eclampsia (Kurniasih et al., 2023). Clinical symptoms of pre-eclampsia appear in pregnancy after 20 weeks with an increase in systolic blood pressure ≥ 140 mm Hg or diastolic pressure ≥ 90 mm Hg and total proteinuria of 300 mg or more than 30 mg/dL per 24 hours (ACOG, 2018; Aljameel et al., 2023; Fox et al., 2019). If not managed properly, Pre-eclampsia can lead to eclampsia with severe hypertension, headaches, vision impairment, and seizures (Zhang et al., 2020). PE is also associated with an increased risk of placental abruption, premature birth, or abortion (Deer et al., 2023), IUGR, acute kidney failure, cerebrovascular and cardiovascular complications, intravascular coagulation, and maternal death (Giorgione et al., 2023; Portelli & Baron, 2018). Therefore, proper and safe management is needed to treat pre-eclampsia.

Until now, there is no pharmacological drug that can treat Pre-eclampsia. The only known treatment is to deliver the baby and the placenta (Magee et al., 2023; Zhang et al., 2020). Acetylsalicylic acid (ASA) and blood pressure-lowering drugs are generally prescribed prophylactically in women who are at high risk of pre-eclampsia but do not resolve the disease. Low-dose aspirin is also widely used to prevent pre-eclampsia and fetal growth retardation in utero. However, the use of aspirin during pregnancy is controversial (Ren et al., 2023). Complementary health approaches are generally more acceptable than pharmacological interventions due to concerns about side effects and effects on the fetus (Murdiningsih et al., 2023; Smith et al., 2020). Hypertension therapy in pregnancy is recommended for women with severe high blood pressure and severe pre-eclampsia because it has side effects for the mother, such as headaches, decreased mental alertness, and activity intolerance, and can affect the fetus so it is not recommended for mild to moderate hypertension (Murdiningsih et al., 2023).

A complementary non-pharmacological approach to lowering blood pressure in pre-eclampsia mothers is by exercising the mind and body such as prenatal yoga. Yoga is a light exercise program that combines stretching the body's muscles, breathing meditation, and promoting health and spiritual growth when done (Aswitami, 2017; Najafi et al., 2023; Upadhyay et al., 2023). Yoga is very effective in reducing the incidence of pre-eclampsia and premature birth and is safe to use during pregnancy (Mamlukah et al., 2020; Murdiningsih et al., 2023; Pais et al., 2021). Yoga has beneficial effects on fetal development and can help decrease complications for both mothers and infants during and after pregnancy. This suggests that yoga may serve as an effective complementary therapy alongside other treatments for expectant mothers (Bouya et al., 2021).

Yoga provides benefits in building balance between all aspects of body and mind, increasing the inner bond between mother and fetus, creating a relaxed condition, and giving a positive aura to the body (Loewenthal et al., 2023; Sulastri et al., 2021; Villar-Alises et al., 2023). Prenatal yoga can also be useful for reducing diastolic and systolic pressure after therapy (Khandekar et al., 2021), reducing anxiety during pregnancy (Deasy et al., 2023), reducing pelvic pain, and improving mental, and physical conditions and perinatal outcomes (Kawanishi et al., 2015).

Another non-pharmacological approach to lowering blood pressure in pre-eclampsia mothers is with self-hypnosis (Umamah et al., 2023). Self-hypnosis is carried out by making direct contact with the subconscious, and by giving suggestions to build various positive emotional states. Previous studies have shown hypnosis can lower blood

pressure in pregnant women with pre-eclampsia (Smith et al., 2020). The management of PE with non-pharmacological therapy combined with yoga and self-hypnosis is currently not widely carried out in the community, so researchers are interested in finding out the effectiveness of both therapies.

METHODS

The method used was quasi-experimental with a pretest-post-test with control group design. The population was all pregnant women with PE in 5 health centers in Bangkalan district from May to August 2024, totaling 48 pregnant women. The sampling technique used simple random sampling with Federer's formula with a total sample of 32 people, 16 people in each group. The inclusion criteria in this research were pregnant women with a gestational age of ≥ 22 weeks. The exclusion criteria in this research were pregnant women with a gestational age of <22 weeks, Pre-eclampsia pregnant women with severe symptoms, Pregnant women with a history of bleeding during pregnancy, Pregnant women with a history of giving birth to low-birth-weight newborns, and mothers with a history of premature rupture of membranes. The instruments used calibrated digital tension meters and Standard Operating Procedures for prenatal yoga and self-hypnosis. The researchers conducted the yoga and self-hypnosis activities in this research, having previously received training and certification in yoga and hypnosis. This research has received an ethical certificate from the Health Research Ethics Commission of the Surabaya Ministry of Health Polytechnic with the number: EA/2402/KEPK-Poltekkes-Sby/V/2024 on April 30, 2024.

Respondents in the intervention group had their blood pressure measured before the intervention. After that, respondents were asked to participate in prenatal yoga exercises and self-hypnosis organized by researchers three times in 12 days (once every four days). After doing prenatal yoga and self-hypnosis, respondents rested for 30 minutes and then measured their blood pressure using a tension meter. The collected data were then processed and analyzed descriptively and inferentially. The Wilcoxon test was used to determine the difference in blood pressure between the pre-and post-tests in each group. In contrast, the Mann-Whitney statistical test performed an inferential analysis to determine the relationship between variables.

RESULTS

Table 1. Distribution of demographic characteristics of pregnant women with PE in Bangkalan, 2024

Respondents' Characteristics	Intervention Groups		Control Group		Equivalency test (p)
	n=16	%	n=16	%	
Age					0,507
less than 20 years	1	6,25	1	6,25	
between 20-35 years	9	56,25	11	68,75	
more than 35 years	6	37,50	4	25	
Education					0,647
No School	0	0	0	0	
Elementary/ Equivalent	6	37,50	4	25,00	
Junior High School/ Equivalent	4	25,00	5	31,25	
High School/ Equivalent	5	31,25	7	43,75	
Academies/ Colleges	1	6,25	0	0	
Job/profession					0,255
Housewife	12	75,00	9	56,25	
Farm labourers/ Factories	2	12,50	3	18,75	

Trader/ Private	1	6,25	2	12,50	
Government employees	1	6,25	1	6,25	
Others	0	0	1	6,25	
Gravida					0,753
Primigravida	3	18,75	4	25,00	
Multigravida	11	68,75	10	43,75	
Grande Multi	2	12,50	2	31,25	

Source: *Primary Data*

Table 1 shows that in the intervention group, most respondents were between 20 to 35 years old or the healthy reproductive age range, which was 56.25%, and the highest level of education was in the elementary education group or equivalent at 37.50%, the most occupation was as a housewife at 75% and the most gravida was in multigravida (68.75%). Meanwhile, in the control group, the most age range is at the age of 20-35 years at 68.75%, the highest level of education is high school or equivalent, the most occupation is housewife (56.25%) and the most gravida is multigravida at 43.75%. Based on Table 1, data was also obtained that both groups have similar characteristics as indicated by a p value >0.05, which means that both data groups are equivalent/homogeneous.

Table 2. Factors related to increased blood pressure in pregnant women with PE at the Bangkalan, 2024

Factors related to blood pressure	**Intervention Groups**		**Control Group**		**Equivalency test**
	n=16	**%**	**n=16**	**%**	**(p)**
IMT					0,448
Underweight	1	6,25	0	0	
Normal	4	25,0	4	25,0	
Overweight	2	12,5	4	25,0	
Obesity I	3	18,75	7	43,75	
Obesity II	6	37,5	1	6,25	
Sports					1,00
Never	11	68,75	11	68,75	
Yes, irregular	5	31,25	5	31,35	
Yes, Regular	0	0	0	0	
Fatty Foods					1,00
No	8	50,0	8	50,0	
Yes	8	50,0	8	50,0	
History of HT in the Family					1,00
No	13	81,25	13	81,25	
Yes	3	18,25	3	18,25	

Source: *Primary Data*

Based on Table 2 data was obtained that in the intervention group and control group, respondents who had a normal BMI were only 25%, and other respondents were mostly in the overweight and obesity categories. Most of the respondents (68.75%) did not exercise regularly, 50% of respondents liked fatty foods, and most of the respondents in both groups did not have a history of hypertension in the family. All data between the two groups are equal to each other.

Table 3. Distribution of Blood Pressure in Pregnant Women with PE at the Bangkalan 2024

Blood pressure	Control Group				*Wilcoxon Sign Rank Test*
	Pre		Post		
	n	%	n	%	
Normal	0	0	3	18,75	
High	16	100	13	81,25	*p* = 0,083
Very High	0	0	0	0	
Blood pressure	**Intervention Groups**				***Wilcoxon Sign Rank Test***
	Pre		**Post**		
	n	**%**	**n**	**%**	
Normal	0	0	13	81,25	
High	16	100	3	18,75	*p* = 0,000
Very High	0	0	0	0	

Source: *Primary Data*

Based on Table 3, the data shows that respondents in the control group did not experience significant changes in blood pressure after being given leaflets (81.3% still had high blood pressure). The results of the Wilcoxon sign rank test with SPSS for Windows with a significance level of α = 0.05 obtained a value of P = 0.083 (P> 0.05) then Ho is accepted which means there is no effectiveness of control treatment on reducing blood pressure in pregnant women with pre-eclampsia. While in the treatment group before being given a combination of prenatal yoga and self-hypnosis, all respondents experienced high blood pressure. After being given a combination of prenatal yoga and self-hypnosis, almost all respondents (81.3%) experienced normal blood pressure and a small portion (18.75%) experienced high blood pressure. The results of the Wilcoxon sign rank test with SPSS for Windows with a significance level of α = 0.05 obtained a value of P = 0.000 (P <0.05) so Ho was rejected, which means there is an effectiveness of the combination of prenatal yoga and self-hypnosis on reducing blood pressure in pregnant women with pre-eclampsia.

Table 4. Differences in the Effectiveness of the Combination of Prenatal Yoga and Self-hypnosis with the Control Group (Leaflet Administration) in Pregnant Women with PE at Bangkalan in 2024

Blood pressure (post)	Group				*Mann Whitney Test*
	Intervention		Control		
	n	%	n	%	
Normal	13	81,3	3	18,7	
High	3	18,3	13	81,3	p=0,001
Very High	0	0	0	0	

Source: *Primary Data*

Table 4, shows that after being given a combination of prenatal yoga and self-hypnosis, almost all respondents (81.3%) experienced a decrease in blood pressure. The results of the Mann-Whitney test with SPSS for Windows with a significance level of a = 0.05 obtained a P value = 0.001 (0.001 <0.05), then Ho was rejected, which means that there is a difference in the effectiveness of the combination of yoga and self-hypnosis with the leaflet group on reducing blood pressure in preeclampsia pregnant women.

DISCUSSION

Pre-eclampsia is a serious condition that can occur during pregnancy, characterized by high blood pressure and the presence of protein in the urine. This condition can lead to severe complications for both the mother and the fetus. Therefore, it is important to seek safe and effective methods to manage blood pressure in pregnant women with pre-eclampsia. Two promising approaches are prenatal yoga and self-hypnosis. The results of our research show that prenatal yoga and self-hypnosis have a significant effect on lowering blood pressure in pregnant women with pre-eclampsia. 81.25% of pregnant women with PE experienced decreased blood pressure after the intervention. The research's results indicated a significant difference in blood pressure among pregnant women with pre-eclampsia who practiced prenatal yoga and self-hypnosis, compared to those who were only provided with informational leaflets.

Prenatal yoga, designed specifically for pregnant women, involves simpler and more accessible movements than traditional yoga, tailored to accommodate the conditions of pregnancy (Gupta et al., 2024). Prenatal yoga combines stretching the body's muscles, breathing meditation, and promoting health and spiritual growth when done (Aswitami, 2017; Najafi et al., 2023; Upadhyay et al., 2023).

Prenatal yoga offers various benefits, including relaxation and the reduction of anxiety (Deasy et al., 2023; Demir & Güngör, 2022) and stress (Demir & Güngör, 2022). It assists pregnant women in alleviating stress through breathing techniques and meditation. Since high stress levels can lead to increased blood pressure, effective stress management is essential for maintaining stable blood pressure. Breathing exercises in yoga are associated with a reduction in vagal tone, leading to lower heart rate and blood pressure (Danielli et al., 2022; Murdiningsih et al., 2023; Nalbant et al., 2022).

Another benefit of doing prenatal yoga regularly is improved blood circulation. The gentle movements in yoga can improve blood circulation, which helps reduce stress on the cardiovascular system. Gentle poses such as child's pose, cat-cow, and sukhasana can relieve tension. Yogic practices offer a range of benefits, including the enhancement of muscular strength and flexibility, as well as the improvement of respiratory and cardiovascular functions. They are also effective in aiding recovery from addiction and in providing treatment for related issues. Additionally, these practices help reduce stress, anxiety, depression, and chronic pain. Furthermore, they contribute to better sleep patterns and overall well-being, ultimately enhancing the quality of life (Woodyard, 2011) so that the condition of pregnant women becomes healthier and blood pressure conditions also become normal.

Yoga creates a relaxation response and facilitates the circulation of renin in the blood by catalyzing the conversion of angiotensin-to-angiotensin I. As a result, cardiac output and peripheral resistance decrease, leading to lower blood pressure. The decrease in systolic and diastolic blood pressure experienced by respondents occurs because pregnant women with hypertension feel relaxed, which stimulates the release of endorphins that can lower blood pressure (Tono et al., 2024). 50 pregnant women respondents showed that prenatal yoga affects *fetal* blood pressure and heart rate. Prenatal yoga can reduce the activity of the sympathetic nervous system, thereby inhibiting the adrenal medulla in releasing catecholamines such as epinephrine and nor-epinephrine. This decrease in catecholamine levels results in dilated blood vessels in the kidneys as well as most visceral organs, which in turn lowers blood pressure and

increases blood flow throughout the body (Dewi et al., 2024).

Yoga can also help improve sleep quality, which contributes to overall health. Prenatal yoga can enhance sleep quality for women in their third trimester by promoting deep relaxation and alleviating tension in the body and mind. This increased comfort and confidence can be invaluable as they prepare for labor. Additionally, prenatal yoga offers various benefits, including pain relief in different areas of the body, improved breathing patterns for achieving relaxation, better heart rate regulation, and further enhancement of sleep quality (Azward et al., 2021).

The condition of pregnant women with pre-eclampsia puts stress pressure on the mother. Pregnant women will feel anxious and afraid that something undesirable will happen to the mother and her baby. Stress causes stress hormones such as cortisol and catecholamines to regulate blood flow and blood pressure, leading to endothelial injury, platelet drilling, and hematopoietic stem cell proliferation (Yao et al., 2019). Stress can be reduced with prenatal yoga. Regular prenatal yoga and self-hypnosis exercises will stimulate the autonomic nervous system to overcome acute stress during pregnancy. Regular prenatal yoga practice was associated with a significantly reduced sympathetic response to mental challenges and quicker recovery after acute psychological stress. These effects persisted throughout pregnancy with regular practice (Lučovnik et al., 2024).

In addition, self-hypnosis also plays an important role in reducing blood pressure in pregnant women with pre-eclampsia. This is because self-hypnosis can help these women overcome anxiety (Deasy et al., 2023) and tension, both of which can contribute to high blood pressure. By practicing self-hypnosis, mothers can become more aware of their bodies and their responses to stress, aiding in the management of blood pressure and lowering it by altering the body's physiological response to stress. The principles of hypnosis such as accepting the mother's condition without judgment, and deep relaxation through imagination will put the mother in a relaxed state and reduce stress (Olendzki et al., 2020).

The combination of prenatal yoga and self-hypnosis also maintains the mental health and emotions of pregnant women so that the emotions of pregnant women become more stable, become calmer with positive affirmations. Prenatal yoga and self-hypnosis activities are also spiritual activities that calm and silence the mind so that the body becomes relaxed which can lower the mother's blood pressure. The integration of mind and exercise interventions will increase mental strength, reduce stress, and improve quality of life (Lurz & Ladwig, 2022; Villar-Alises et al., 2023). Mind processing can affect the central nervous system by relaxing blood vessels, thereby increasing blood flow and lowering blood pressure, and can balance the autonomic nerves that help the body maintain normal blood pressure, helping to reduce stress by increasing self-control, leading to better mood and the ability to manage *stress* (Hartono & Mariani, 2023). Techniques in self-hypnosis such as imagining a peaceful and calming place can help relieve stress. In addition, positive affirmations using positive sentences to strengthen self-confidence can reduce anxiety.

Combining prenatal yoga and self-hypnosis may provide even greater benefits. Yoga practices that emphasize breathing and relaxation can be integrated with self-hypnosis techniques, providing a holistic approach to managing blood pressure. Further research is needed with a larger sample size and a broader area to better understand the characteristics of yoga and self-hypnosis in reducing blood pressure in pregnant women with pre-eclampsia.

CONCLUSION

The combination of yoga and self-hypnosis is effective in decreasing blood pressure in pregnant women with pre-eclampsia by increasing the mother's physical, mental, and spiritual strength in dealing with pregnancy.

SUGGESTION

Prenatal yoga and self-hypnosis can be used for non-pharmacological therapy in pre-eclampsia with blood pressure conditions that are not too high in pregnancies above 20 weeks. Regular practice of prenatal yoga and self-hypnosis will improve physical and mental health, and create a calmer and more balanced environment for both mother and baby. It is always advisable to consult a doctor or health professional before starting a prenatal yoga and self-hypnosis program, especially in cases of high-risk pregnancies.

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CONFLICTS OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHORS CONTRIBUTION

SA and DI conceived and designed the project. SA conducted the literature search and drafted the article. SW and DI provided suggestions and developed ideas for revising the paper. All authors contributed to the article and approved the submitted version.

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