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ORIGINAL RESEARCH

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## EFFECTIVENESS OF LAVENDER AROMATHERAPY AND CLASSICAL MUSIC THERAPY IN LOWERING BLOOD PRESSURE IN PREGNANT WOMEN WITH HYPERTENSION

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**Abstract**

**Background:** Hypertension during pregnancy remains high in Indonesia. It is a major cause of maternal death. Aromatherapy lavender and classical music therapy are considered effective in lowering blood pressure in hypertension.

**Objective:** To examine the effect of lavender aromatherapy and classical music therapy in lowering blood pressure in pregnant women with hypertension.

**Methods:** A quasi-experimental study with pretest-posttest control group design. There were 52 pregnant women selected using simple random sampling, divided into lavender aromatherapy group, classical music group, combination of aromatherapy and music group, and control group. Sphygmomanometer was used to measure blood pressure. Mann Whitney and Post Hoc test were used for data analysis.

**Results:** Results showed that four groups had a significant decrease in systolic blood pressure after given intervention with p-value <0.05. The mean decrease of systolic blood pressure among four groups was: lavender group (5.77 mmHg), music group (7.23 mmHg), combination group (9.54 mmHg), and control group (3.67 mmHg); and the mean decrease of diastolic blood pressure was: the lavender group (2.77 mmHg), music group (0.61 mmHg), combination group (8.23 mmHg), and control group (3.42 mmHg).

**Conclusion:** There was a significant effect of lavender aromatherapy and classical music therapy in lowering blood pressure in pregnant women with hypertension. However, the combination of both interventions was more effective than lavender aromatherapy or music therapy alone.

**Keywords:** lavender aromatherapy; Mozart classic music; blood pressure; pregnant women

## INTRODUCTION

Pregnancy is the most critical stage of a woman as this is the time when she needs the maximum protection, love, and care; and it becomes a major concern of health professionals, especially midwives. A mother with health condition physically and emotionally is expected. However, this expectation is not always achievable, as there may be health problems during pregnancy.

The most common complication is hypertension in pregnancy ([Chen, Wen, Smith, Yang, & Walker, 2006](#)). According to WHO (World Health Organization), hypertension during pregnancy is the leading cause of perinatal death and morbidity ([WHO & partners, 2015](#)). Some complications that can be caused by hypertension in pregnancy include plasma fluid deficiency due to blood

vessel disorders, renal impairment, hematological disorders, cardiovascular disorders, liver disorders, respiratory disorders, HELLP syndrome (hemolysis, elevated liver enzymes, low platelet count), and fetus problems such as late growth, prematurity to uterine death. Hypertension in pregnancy can also continue in preeclampsia and eclampsia that can cause death in the mother as well as in the fetus ([Prawirohardjo, 2010](#)).

In Indonesia, mothers are still dominated by bleeding, hypertension in pregnancy, and infection. However, since 2010 the proportions have changed, where bleeding and infection tend to decrease while hypertension in pregnancy increases in 2013. More than 25% of maternal deaths in Indonesia are caused by hypertension in pregnancy ([MOH, 2014](#)). The highest maternal deaths in Semarang were due to eclampsia (34%), bleeding (28%), disease (26%), and others (12%) ([Dinkes, 2014](#)). Thus, an effort to deal with hypertension is needed.

Based on data obtained at the Community Health Center of Gayamsari, the number of pregnant women with hypertension in 2015 amounted to 8 women, Health Center of Tlogosari was 13 women, Health Center of Kedungmundu as many as 7 women, Health Center of Ngesrep was 5 women, Health Center of Pudukpayung was 6 women, Health Center of Gunung Pati was 11 women, and Health Center of Ngaliyan 11 women.

This study aimed to use non-pharmacological treatment, namely aromatherapy using lavender and music therapy. Literature indicated that aroma lavender therapy not only affects the physical but also the emotional level ([Sharma, 2009](#)). Aromatherapy using lavender can decrease anxiety, joint pain, high blood pressure, heart frequency, metabolic rate, and overcome sleep disorders (insomnia), stress and increase production of the hormone melatonin and serotonin ([Apyanti, Suhartono, & Ngadiyono, 2017](#); [Karo, Pramono, Wahyuni, Mashoedi, & Latifah, 2017](#)). While music is an organized audio stimulus consisting of melody, rhythm, harmony, timbre, shape and

style. Music is not just a sound but also a composition of sounds and is able to help the body and mind cooperating with each other ([Gouk, 2017](#)). The music used for relaxation is the alkaline music, which is a soft, instrumental music, meditative music, and relaxing and happy music ([Yusuf et al., 2017](#)). In the brain there is a center of visual and auditory association that serves to interpret the object seen and heard. Information from the center located on the surface of the brain will be delivered to the emotional center of the limbic system, thus it will lead to calmness and relaxation ([Astuti, Suryono, Widyawati, Suwondo, & Mardiyono, 2017](#)). Calm can have an impact on the body's physiology such as slowing heartbeat, deep and long breathing, and decreased blood pressure.

Previous study showed that music has been shown to increase interleukin-I (IL-1) in blood so that it can improve immunity. It also affects the cardiovascular system (lowering blood pressure in adolescents) after given classical music for 30 minutes ([Sarayar, Mulyadi, & Palandeng, 2013](#)). Other studies also revealed that music is able to improve the psychological health of pregnant women by lowering the number of anxiety, stress, and depression, which usually experienced by pregnant mother ([Chang, Chen, & Huang, 2008](#)).

## METHODS

### *Study Design*

This study employed a quasi-experimental design with pretest posttest control group.

### *Settings*

This research was conducted on 11 November 2016 until 8 January 2017 in the working area of the Community Health Center of Gayamsari, Tlogosari, Kedungmundu, Ngesrep, Pudukpayung, Gunungpati, and Ngaliyan.

### *Sample*

Using simple random sampling, there were 52 pregnant women recruited, which 13 assigned in the four groups: (i) Lavender aromatherapy group, (ii) Classical music group, (iii) Combination group (aromatherapy and

classical music therapy), and (iv) Control group. The inclusion criteria in this study were pregnant women with hypertension, gestational age 20 weeks and above, mothers and babies were in health condition, and willing to be respondent. While the exclusion criteria included pregnant women with eclampsia, and those who followed alternative treatments such as massage or acupuncture.

#### Intervention

Lavender aromatherapy is a fragrance extracted from lavender flowers (*Lavandula Angustifolia*) in the form of essential oil. Lavender aromatherapy is given by mixing five drops of lavender essential oil with 20 ml of water inserted into the diffuser, which emits steam. Aromatherapy was administered at the respondent's home for 20 minutes. As for music therapy, the music used was the classic cassation of the composer of W.A Mozart and given for 20 minutes. For combination group, aromatherapy and classical music were given simultaneously, and the control group received standard services for pregnant women.

#### Instrument

A digital sphygmomanometer was used to measure blood pressure, which was measured before and after given intervention. Normal

blood pressure if systolic blood pressure is equal to 120 mmHg and diastole 80 mmHg.

#### Ethical Consideration

Prior to data collection, the researcher first requested study permission from the National Unity and Politics of Semarang and Department of Health of Semarang. The ethical clearance was obtained from the Ethics Commission of POLTEKKES Semarang with number: 279 / KEPK / Poltekkes-SMG / EC / 2016.

#### Data Analysis

Data were in non-normal distribution based on the results of Kruskal Wallis test. Thus, Mann Whitney and Post Hoc test were used for data analysis.

### RESULTS

Table 1 shows that the mean age of the respondents ranged from 28 to 30 years old, with parity 1-2, and gestational age ranging from 25- 27 weeks. Further analysis obtained  $p > 0.05$  in all characteristics, which indicated that there was no significant difference of the characteristics of pregnant women in the four groups.

**Table 1** Characteristics of the respondents based on age, parity, and gestational age

Variable	Group	Mean $\pm$ SD	Min	Max
Age (year)	X <sub>1</sub>	28.46 $\pm$ 6.59	17	40
	X <sub>2</sub>	30.54 $\pm$ 7.63	20	42
	X <sub>3</sub>	29.23 $\pm$ 8.05	19	41
	C	29.17 $\pm$ 7.56	19	46
Parity	X <sub>1</sub>	1.69 $\pm$ 0.75	1	3
	X <sub>2</sub>	2.08 $\pm$ 1.11	1	4
	X <sub>3</sub>	2.15 $\pm$ 0.98	1	4
	C	1.92 $\pm$ 1.08	1	4
Gestational age (week)	X <sub>1</sub>	25.38 $\pm$ 3.68	21	31
	X <sub>2</sub>	25.69 $\pm$ 3.52	20	31
	X <sub>3</sub>	26.38 $\pm$ 3.12	21	30
	C	27.58 $\pm$ 4.66	20	36

X<sub>1</sub> : Lavender aromatherapy group | X<sub>2</sub> : Classical music group | X<sub>3</sub> : Combination group  
C : Control group

**Table 2** Systolic and diastolic blood pressure before and after given intervention in the lavender aromatherapy group, classical music group, combination group, and control group

Variable	Group			
	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	C
Systolic pretest				
Mean (SD)	137.69±5.02	137.6±24.40	142.00±5.33	137.25±5.08
Median	140	137	140	136,5
Minimum	130	129	134	150
Maximum	146	146	150	146
Systolic Posttest				
Mean (SD)	131.92±7.29	130.38±6.07	132.46±3.75	133.58±4.83
Median	132	132	132	133.5
Minimum	121	121	126	126
Maximum	148	138	138	143
Diastolic Pretest				
Mean (SD)	86.77±4.45	86.31±5.45	90.23±5.24	88.17±3.88
Median	86	87	90	89,5
Minimum	81	80	82	81
Maximum	94	95	100	93
Diastolic Post test				
Mean (SD)	84.00±3.10	85.69±3.54	82.00±4,12	84.75±4.13
Median	83	86	81	85
Minimum	80	80	75	80
Maximum	90	90	88	91

X<sub>1</sub> : Lavender aromatherapy group | X<sub>2</sub> : Classical music group | X<sub>3</sub> : Combination group | C : Control group

Table 2 shows that the mean systolic – diastolic blood pressure before given intervention was 137.69/86.77 mmHg (Lavender aromatherapy group), 137.62/86.31 mmHg (Classical music group), 142.00/90.23 mmHg (Combination group), and 137.25/88.17 mmHg (Control group); and that the mean systolic – diastolic blood pressure after given intervention was 131.92/84.00 mmHg (Lavender aromatherapy group), 130.38/85.69 mmHg (Classical music group), 132.46/82 mmHg (Combination group), and 133.58/84.75 mmHg (Control group).

While Table 3 shows that all group have a significant decrease of systolic blood pressure after given intervention with p-value <0.05. The mean decrease of systolic in the lavender group was 5.77 mmHg, music group 7.23 mmHg, combination group 9.54 mmHg, and control group 3.67 mmHg; and the mean decrease of diastolic blood pressure in the lavender group was 2.77 mmHg, music group 0.61 mmHg, combination group 8.23 mmHg, and control group 3.42 mmHg. Among the four groups, the combination group showed the highest decrease in systolic – diastolic blood pressure in pregnant women.

**Table 3** Effect of lavender aromatherapy, classical music and its combination in lowering blood pressure in pregnant women with hypertension

Variable	Group	Mean±SD	Median	Min	Max	P-value
Systolic difference (mmHg)	X <sub>1</sub>	5.77±7.87	8	8	18	0.026
	X <sub>2</sub>	7.23±4.07	6	2	15	
	X <sub>3</sub>	9.54±4.19	9	1	17	
	C	3.67±4.23	3	2	14	
Diastolic difference (mmHg)	X <sub>1</sub>	2.77±3.85	3	3	11	0.002
	X <sub>2</sub>	0.61±5.12	1	9	13	
	X <sub>3</sub>	8.23±4.58	9	2	17	
	C	3.42±4.21	1.5	1	11	

X<sub>1</sub> : Lavender aromatherapy group | X<sub>2</sub> : Classical music group | X<sub>3</sub> : Combination group | C : Control group

**Table 4** Post hoc test in systolic-diastolic blood pressure among the four groups

Variable	Group	Group	p-value
Systolic (mmHg)	X <sub>1</sub>	X <sub>2</sub>	0.650
		X <sub>3</sub>	0.204
		C	0.574
	X <sub>2</sub>	X <sub>3</sub>	0.113
		C	0.010*
		C	0.003*
Diastolic (mmHg)	X <sub>1</sub>	X <sub>2</sub>	0.139
		X <sub>3</sub>	0.007*
		C	0.979
	X <sub>2</sub>	X <sub>3</sub>	0.001*
		C	0.186
		C	0.007*

X<sub>1</sub> : Lavender aromatherapy group | X<sub>2</sub> : Classical music group | X<sub>3</sub> : Combination group  
C : Control group

Post hoc test as shown in the Table 4 shows that there was a significant difference in systolic blood pressure between classical music group and control group ( $p=0.010$ ), and between combination group and control group ( $p=0.003$ ); while in diastolic group there was a significant difference between lavender aromatherapy group and combination group ( $p=0.007$ ), between classical music group and combination group ( $p=0.001$ ), and between combination group and control group ( $p=0.007$ ).

## DISCUSSION

This study aimed to examine the effect of lavender aromatherapy and classical music therapy in lowering blood pressure in pregnant women with hypertension. Findings of this study showed that there was a significant effect of lavender aromatherapy and classical music therapy and combination of both interventions in systolic-diastolic blood pressure in pregnant women with hypertension.

A lavender aromatherapy showed a significant effect on the decrease of blood pressure in this study is in line with previous study revealed that there was a decrease of blood pressure after given aromatherapy. In addition, aromatherapy can also improve sleep quality ([Sarayar et al., 2013](#)).

The smell from aromatherapy has a direct effect on the human brain. The aroma is captured by the receptor in the nose which then sends further information to areas of the

brain that control and relate to the mood, emotion, memory that provides information to the hypothalamus which is the regulator of the internal system of the body, including the system of regulating body temperature and heart rate. Inhaling lavender aromatherapy will increase alpha waves in the brain and it is these waves that create a relaxed feeling that can cause decreased blood pressure ([Hwang, 2006](#)).

The significant effect of classical music therapy in this study also supports the results of previous study that revealed that there was a decrease of systolic of 8.6 mmHg and diastolic of 5.8 mmHg after given aromatherapy ([Suviani, Artana, & Putra, 2014](#)). Other studies have shown that intervention by listening to classical music can effectively alter brain waves, which in a stressful state become more relaxed resulting in decreased blood pressure and pulse ([Campbell, 2001](#)).

Music is heard through the ear and then stimulated to the brain; the music will be continued to the hypothalamus. Music interacts on an organic level with a variety of neural structures. It produces rhythmic stimuli, which are then captured through the auditory organs and processed through the nervous system and glands that further organize sound interpretations into the internal rhythm of hearing ([Chang et al., 2008](#)).

Sound waves of music delivered to the brain in the form of electrical energy through a

neural network that will generate brain waves that will be distinguished over the frequency of alpha waves that will generate relaxation; where beta waves are associated with mental activity, theta waves are associated with stressful situations and creative efforts; and the delta waves are connected with a sleepy situation. The sound of music can affect the frequency of the brain according to the music. When the body relaxes, it will emit alpha, beta, theta and delta waves, which give the effect of relaxation and blood pressure decreased (Merritt, 2003).

However, this study revealed that the combination of lavender aromatherapy and classical music therapy have a highest effect in lowering blood pressure in pregnant women with hypertension compared with lavender aromatherapy or music therapy alone. This combination at the same time can simultaneously lower blood pressure in pregnant women with hypertension. It can increase the alpha and beta waves in the brain and these waves will form to create a relaxed state. The effect of lavender aromatherapy is similar to the effects of classical music that have similar calming effect, balance, comfort, sense of openness and confidence, while also reducing stress, pain, anxiety, unbalanced emotion, the hysteria, the frustration, and provide a sense of relaxation that can affect blood pressure, heart rate and breathing.

Limitation of the study included that the measurement of blood pressure before and after given intervention was at the same day which might limit the observation to see the effect of intervention. Therefore, further study with longer time is needed.

## CONCLUSION

In summary, there was a significant effect of lavender aromatherapy and classical music therapy in lowering blood pressure in pregnant women with hypertension. However, the combination of both interventions was more effective than lavender aromatherapy or music therapy alone. Thus, the combination of the two interventions is recommended to lower blood pressure in pregnant women with hypertension.

## Declaration of Conflicting Interest

None declared.

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## Author Contribution

All authors contributed equally in this study.

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