

## Effectiveness of Ear Acupressure on Gestational Hypertension

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### ABSTRACT

Hypertensive disorders (HD) affect up to 10% of pregnancies worldwide. Gestational Hypertension 17% will progress to preeclampsia if left untreated. Acupressure has been used for centuries to treat a variety of symptoms associated with pregnancy and is also known to lower blood pressure in hypertension. However, the use of ear acupressure as an adjunct to conventional care for hypertensive disorders in pregnancy is underrepresented in the scientific literature. This study aimed to determine the effectiveness of ear acupressure on gestational hypertension. The research method employed a pre-experimental design with a one-group pre-post design. A sample of 15 people received antenatal care and ear acupressure. Analysis using the Paired T Test. The study's results showed a difference in the average blood pressure of primigravida women in the 2nd and third trimesters, both before and after ear acupressure, of 6 mmHg systolic and 4 mmHg diastolic. The results of the Paired t-test  $p = 0.00$ . The conclusion is that ear acupressure affects the blood pressure of primigravida during the second and third trimesters.

## Introduction

Hypertension in pregnancy occurs in 10% of pregnant women worldwide. This condition can include preeclampsia, eclampsia, gestational hypertension, and chronic hypertension. Gestational hypertension is a pregnancy complication that occurs after the 20th week of pregnancy and usually improves within 6 weeks after delivery, without evidence of maternal organ damage, with mild blood pressure (BP) criteria of 140-159 / 90-109 mmHg and severe  $\geq 160 / 110$  mmHg (Lukito et al., 2019) and not accompanied by proteinuria, but must be watched out for because 17% of Gestational Hypertension will develop into Pre-Eclampsia. The results of the study also reported that this development is more likely if the diagnosis of HG is found at a gestational age of fewer than 34 weeks, which is 36% -42%. (Melamed et al., 2014) (Garovic et al., 2022) Hypertension in pregnancy is the second leading cause of maternal death after bleeding. This complication has the second-highest prevalence after Premature Rupture of Membranes (PROM) in East Java, at 4.3%. (Indonesian Ministry of Health, 2023). Standard therapy applied to complications of gestational hypertension includes pharmacological therapy (such as nifedipine, amlodipine, methyldopa, and aspirin) and non-pharmacological treatments such as bed rest, dietary changes, and weight restrictions. Pharmacological therapy has side effects on the mother and fetus, such as increased maternal heart rate (tachycardia), so

that more mothers experience complications and the risk of blood pressure dropping too low, which results in blood flow to the placenta, which is risky for the fetus (Ernawati et al., 2023).

Complementary acupuncture and acupressure care for hypertension problems has generally been applied, but clinical evidence related to acupuncture and acupressure for hypertension in pregnancy is still rarely reported. Ear acupressure is acupressure performed on the outer earlobe which is believed to be on the meridian in the outer ear identical to the inverted fetal position and is a projection of the internal organs of the body, so that by performing ear acupressure it can reach all parts of the body's anatomy and various organs of the brain, spinal cord and central and peripheral nerves (Keshtkar et al., 2024). This method regulates the flow of energy throughout the body, thereby enhancing overall well-being in humans. Research on ear acupressure to alleviate hypertension problems has been widely conducted and has been proven to lower blood pressure. Previous studies reported that the average systolic blood pressure, based on the Mann-Whitney test, was not statistically significant between the two groups before the intervention and in the first two weeks after the intervention ( $p > 0.05$ ); however, after the third week of intervention, the average systolic blood pressure in the intervention group was significantly higher, while the average diastolic blood pressure was not statistically significant between the two groups before the intervention and the first week after the intervention ( $p < 0.001$ ) (Keshtkar et al., 2024).

A case study conducted by Cristina Jackson on three pregnant women with hypertension reported that acupuncture was successful in managing gestational hypertension and in mothers with a history of preeclampsia (Jackson & Bailey, 2022). Studies on the effectiveness of ear acupressure in managing gestational hypertension are still limited; therefore, this study aims to investigate the impact of ear acupressure on gestational hypertension and fetal well-being.

## **Method**

The study was conducted on primigravida pregnant women at the Winda Independent Midwife Practice Place (TPMB) from January to March 2025. The enumerators who participated in this study were two midwives who held a Midwife certification (STR), as well as APN and MU training certificates. Before the study was conducted, a common perception was first shared with the enumerators. The selection of research subjects by purposive sampling was 15 people who met the inclusion and exclusion criteria: gestational age  $\geq 20$  weeks, blood pressure  $\geq 140/90$  mmHg, pregnancy without a history of previous illness, single pregnancy, not illiterate, no external ear disease, no swelling in the feet, and no proteinuria. The exclusion criteria: eclampsia and HELPP syndrome, systolic blood pressure  $\geq 160$  mmHg, diastolic blood pressure  $\geq 110$  mmHg, pregnancy complicated by vaginal bleeding, mothers who smoke, drink alcohol, and use psychotropic substances, premature risk pregnancy, and new disease diagnosis during the study.

Before the intervention, respondents were informed and provided their informed consent. Then, a physical and obstetric examination was conducted, including measurement of body weight, blood pressure, fetal heart rate, and fetal movement. Respondents' blood pressure was measured using an ABN

mercury sphygmomanometer, made in Germany. To ensure the validity of the sphygmomanometer, blood pressure was measured twice, with an interval of 15 minutes between measurements. Subjects rested for 5 minutes in a quiet, temperature-controlled room with the upper arm at heart level. After that, both right and left outer ears were acupressed at the Shenmen, Liver, Kidney, Low Blood Pressure/hypertension groove, and Sympathetic points. Respondents were asked to practice again until they could perform ear acupressure correctly, so that they could do it independently at home. Changes in blood pressure before and after ear acupressure were assessed and observed once a week for two weeks. Mothers at home were asked to perform ear acupressure at least three times a day for 2-3 minutes.

The data were analyzed using the Shapiro-Wilk test to determine whether the data were normally distributed, and then analyzed using the paired t-test.

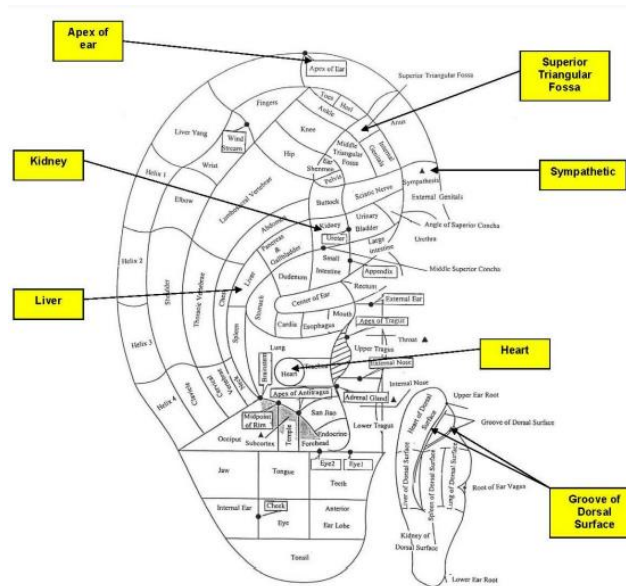


Figure 1. Point Shenmen, Hati, Ginjal, Hypertension Groove, and Simpatik (Suen et al., 2014)

## Results

The following presents data on the characteristics of pregnant women in the second and third trimester with Gestational Hypertension.

Table 1 shows that less than half of the respondents are aged 20-25 years (46.67%). The average age of respondents is 19 years, with a minimum age of 19 years and a maximum age of 31 years. Most respondents have a high school education, with 10 people (66.67%) holding this level of education. More than half are unemployed or housewives (53.33%). The gestational age of the respondents is more than half, ranging from 26 to 30 weeks of gestation. Specifically, eight people (53.33%) have an average gestational age of 29 weeks, with a minimum gestational age of 24 weeks and a maximum gestational age of 35 weeks.

**Table 1.** Demographic Characteristics of Primigravida Trimester 2 & 3 with Gestational Hypertension

| Characteristics        | Ear Acupressure    |           | Mean±SD        |              |
|------------------------|--------------------|-----------|----------------|--------------|
|                        | n                  | %         | Median;Min-Max |              |
| <b>Age (year)</b>      | <20                | 1         | 6,67           | 19,15±11,83; |
|                        | 20-25              | 7         | 46,67          | 24,50;19-31  |
|                        | 26-30              | 6         | 40,00          |              |
|                        | >30                | 1         | 6,67           |              |
|                        | Total              | <b>15</b> | <b>100,00</b>  |              |
| <b>Education</b>       | Junior High School | 0         | 0              |              |
|                        | Senior High School | 10        | 66,67          |              |
|                        | Diploma            | 3         | 20,00          | -            |
|                        | Bachelor's Degree  | 2         | 13,33          |              |
|                        | Total              | <b>15</b> | <b>100,00</b>  |              |
| <b>Work</b>            | Housewife          | 8         | 53,33          |              |
|                        | Self-employed      | 3         | 20,00          | -            |
|                        | Private            | 4         | 26,67          |              |
|                        | Total              | <b>15</b> | <b>100,00</b>  |              |
| <b>Gestational age</b> | 20-25              | 3         | 20,00          | 29,00±3,23;  |
|                        | 26-30              | 8         | 53,33          | 29,00;24-35  |
|                        | 31-35              | 4         | 26,67          |              |
|                        | Total              | <b>15</b> | <b>100,00</b>  |              |

The following is special data on the blood pressure of respondents before and after ear acupressure.

**Table 2.** Blood Pressure Primigravida Trimester 2 & 3 Pre-test posttest Ear Acupressure

| Respondents    | Blood Pressure  |            | Blood Pressure    |            | Blood Pressure    |             | p value |
|----------------|-----------------|------------|-------------------|------------|-------------------|-------------|---------|
|                | Pre-test (mmHg) |            | Posttest 1 (mmHg) |            | Posttest 2 (mmHg) |             |         |
|                | Systole         | Diastole   | Systole           | Diastole   | Systole           | Diastole    |         |
| 1              | 142             | 80         | 140               | 80         | 135               | 79          | 0,060*  |
| 2              | 140             | 82         | 135               | 78         | 130               | 75          |         |
| 3              | 145             | 83         | 140               | 80         | 138               | 80          |         |
| 4              | 140             | 78         | 135               | 76         | 130               | 75          |         |
| 5              | 143             | 82         | 140               | 80         | 140               | 80          |         |
| 6              | 140             | 80         | 136               | 78         | 135               | 75          |         |
| 7              | 138             | 80         | 135               | 78         | 130               | 75          |         |
| 8              | 135             | 78         | 133               | 78         | 130               | 78          |         |
| 9              | 140             | 81         | 138               | 79         | 135               | 75          |         |
| 10             | 142             | 82         | 140               | 80         | 135               | 78          |         |
| 11             | 143             | 80         | 140               | 80         | 140               | 80          |         |
| 12             | 142             | 82         | 138               | 78         | 135               | 75          |         |
| 13             | 140             | 83         | 139               | 80         | 135               | 75          |         |
| 14             | 145             | 85         | 143               | 83         | 143               | 80          |         |
| 15             | 144             | 82         | 140               | 80         | 138               | 78          |         |
| Mean           | 141,27±2,       | 81,20±1,89 | 138,13±2,         | 79,20±1,6  | 135,27±4,0        | 77,20±2,24  |         |
| ±SD;           | 69;142,00;      | ;82,00;78- | 75;139,00;        | 1;80,00;76 | 6;135,00;1        | ;78,00; 75- |         |
| Median;Min-Mak | 135-145         | 85         | 133-143           | -83        | 30-143            | 80          |         |

\*Uji Shapiro wills

In Table 2, the respondents' blood pressure before receiving ear acupressure was as follows: the average systolic blood pressure was 141 mmHg, the minimum systolic blood pressure was 135 mmHg, and the maximum systolic blood pressure was 145 mmHg. While the diastolic blood pressure was 81 mmHg, the minimum diastolic blood pressure was 78 mmHg, and the maximum diastolic blood pressure was 85 mmHg.

After ear acupressure (post 1), the average systolic blood pressure of the respondents was 138 mmHg, with a range of 133 mmHg to 143 mmHg. While the systolic blood pressure was 79 mmHg, the minimum diastolic blood pressure was 76 mmHg, and the maximum diastolic blood pressure was 83 mmHg.

The results of the second blood pressure observation post ear acupressure showed that the average value of the respondents' systolic blood pressure was 135 mmHg, with a minimum of 130 mmHg and a maximum of 143 mmHg. While the diastolic blood pressure was 77 mmHg, the minimum diastolic blood pressure was 75 mmHg, and the maximum diastolic blood pressure was 80 mmHg. The difference in the average blood pressure of primigravida in the 2nd and third trimesters before and after ear acupressure was six mmHg systolic and 4 mmHg diastolic. The results of the Shapiro-Wilk test analysis ( $\rho = 0.060$ ) indicate that the data are normally distributed, allowing the analysis to use a parametric test.

**Table 3.** Blood Pressure Analysis of Primigravida Trimester 2 & 3 before and after ear acupressure

| Tekanan Darah<br>(mmHg) | Pre-test  |               | Post-test 1 |               | Posttest 2 |               | $\rho$ value |
|-------------------------|-----------|---------------|-------------|---------------|------------|---------------|--------------|
|                         | n         | %             | n           | %             | n          | %             |              |
| <140/80                 | 2         | 13,34         | 9           | 60,00         | 12         | 80,00         | 0,00*        |
| $\geq$ 140/80           | 13        | 86,66         | 6           | 40,00         | 3          | 20,00         |              |
| <b>Total</b>            | <b>15</b> | <b>100,00</b> | <b>15</b>   | <b>100,00</b> | <b>15</b>  | <b>100,00</b> |              |

\*Uji Paired t test

Table 3 shows that most primigravida patients had blood pressure readings greater than 140 mmHg before ear acupressure was performed, amounting to 13 (86.66%). After ear acupressure (post 1), more than half of them, 9 (60.00%), with blood pressure <140/80 mmHg, as well as blood pressure post 2, most of them, 12 (80.00%), with blood pressure <140/80 mmHg. The results of the paired t-test ( $\rho = 0.00$ ,  $p < 0.05$ ) indicate that ear acupressure affects the blood pressure of primigravida during the second and third trimesters.

## Discussion

Most respondents in this study were aged 20–25 years (46.67%), with an age range of 19 to 31 years. Young age in primigravida is closely related to anxiety and uncertainty in facing the first pregnancy. According to Li et al. (2017), individuals aged <25 years have a higher risk of pregnancy anxiety, which can physiologically trigger activation of the sympathetic nervous system and increase blood pressure. Auricular acupressure, which stimulates the Shen Men and Point Zero points, is known to reduce sympathetic activity and increase relaxation (Yeh et al., 2016; Wang et al., 2021). Thus, the decrease in blood pressure, from 141.27 mmHg to 135.27 mmHg in systole, and from 81.20 mmHg to 77.20 mmHg in diastole, is likely influenced by the increased relaxation response following the intervention.

The majority of respondents (66.67%) had a high school education. Secondary education provides a sufficient foundation of understanding to accept alternative therapies. A study by Gao et al. (2020) stated that the acceptance of acupressure interventions is greatly influenced by health literacy. The ability to understand that blood pressure is not only controlled by drugs, but can also be influenced by relaxation techniques such as acupressure, is a key factor in the success of therapy. Additionally,

education plays a crucial role in enhancing compliance with the therapy schedule, which has a direct impact on the effectiveness of the results. As many as 53.33% of respondents were housewives (IRT). Although not working formally, household responsibilities and domestic stress are often triggers for psychological stress that affects blood pressure (Ching et al., 2022). This is in line with the neuroendocrine Theory, Which Suggests that psychosocial stress increases cortisol levels and sympathetic nervous system activity (Kim et al., 2013). With the ear acupressure approach, which has been shown to stimulate the balance of the autonomic system (Litscher, 2018), housewives in this study may experience more significant benefits than respondents with formal jobs, who often have tighter schedules.

More than half of the respondents were 26–30 weeks pregnant (53.33%). From the second trimester to the beginning of the third trimester, the mother's body is in an optimal stage of adjustment to pregnancy. Increased blood volume and heart function begin to stabilize. According to Garovic et al. (2022), at this gestational age, the risk of gestational hypertension begins to increase. With therapies such as acupressure, which increase peripheral blood flow and reduce vascular tension, the effect can be more optimal than during early or late gestation (Keshtkar et al., 2024). The study's results showed a consistent and significant decrease in blood pressure. Before therapy, 86.66% of respondents had blood pressure  $\geq 140/80$  mmHg. After the first intervention, only 40% remained in that category, and after the second intervention, only 20% of them remained. These results align with research by Suen et al. (2014), which found that auriculotherapy significantly reduced systolic blood pressure in a population of patients with primary hypertension.

Meta-analysis studies, such as those conducted by Zhang et al. (2018) and Huang et al. (2021), also support the claim that Shen Men and Point Zero have a direct physiological effect on blood pressure regulation. The results of this study indicate that auricular acupressure has a significant effect in lowering blood pressure in primigravida women with gestational hypertension during the second and third trimesters. Before the intervention, most respondents (13, 86.66%) had blood pressure  $\geq 140/80$  mmHg. However, after two acupressure treatments, there was a significant decrease, with 80% of respondents achieving blood pressure  $< 140/80$  mmHg. The average systolic blood pressure decreased from 141.27 mmHg to 135.27 mmHg, while the diastolic pressure decreased from 81.20 mmHg to 77.20 mmHg. The results of the paired t-test showed significance ( $p = 0.00$ ), indicating a statistically significant effect of auricular acupressure on blood pressure. Physiologically, this effect can be explained through the neurovegetative reflex mechanism. The human ear has numerous acupressure points that are connected to the central nervous system via the auricular branch of the vagus nerve. Stimulation of certain points can induce sedative and vasodilatory effects by decreasing sympathetic activity and increasing parasympathetic activity, resulting in a decrease in blood pressure (Keshtkar et al., 2024; Gao et al., 2020).

The decrease in blood pressure not only demonstrates the effectiveness of the intervention but also highlights the importance of managing gestational hypertension through a comprehensive approach. Non-pharmacological interventions such as ear acupressure can be a relevant alternative amidst limited

access to safe antihypertensive drugs during pregnancy, especially in areas with limited health resources (Ernawati et al., 2023). In addition, these results provide an opportunity to review.

## Conclusions

Auricular acupressure is effective in lowering blood pressure in primigravida pregnant women with gestational hypertension. This effect is especially relevant in respondents with a secondary education background and in the second to third trimester of pregnancy.

## Recommendation

The researchers acknowledge that, although the results of this study are positive, several limitations exist. The small sample size ( $n = 15$ ) and the study's design, which did not involve a control group, limit the generalizability of these findings. Therefore, the researchers suggest that further research be conducted with a randomized controlled trial design and a larger sample size to strengthen the validity and reliability of the results. In addition, a qualitative approach to the subjective experiences of pregnant women with this therapy has not been explored in this study. Patient perception and comfort with non-drug therapy are also important indicators of treatment success. Further studies that highlight this aspect can enhance our understanding of implementing holistic therapy based on cultural considerations and patient comfort.

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