

Original Research

Effect of Puerperal Exercises and Auricular Acupressure on Uterine Involution

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ABSTRACT

The process of uterine involution in postpartum mothers does not always proceed smoothly, potentially leading to subinvolution of the uterus and postpartum hemorrhage. This study aims to determine the influence of puerperal exercises and auricular acupressure on uterine involution in postpartum mothers. The research utilized a quasi-experimental design with a post-test-only control group. The study was conducted in Bengkulu City. The sample consisted of 40 postpartum mothers, divided into 20 respondents in the intervention group receiving a combination of puerperal exercises and auricular acupressure, and 20 respondents in the control group receiving only puerperal exercises. Sampling technique was done through purposive sampling. The instruments used were a measuring tape and a questionnaire. Data analysis employed independent T-test. The results indicate a decrease in the height of the uterine fundus in both intervention and control groups, but the decrease in uterine involution was more significant in the intervention group ($p=0.000$). The study concludes that there is an influence of the combination of puerperal exercises and auricular acupressure on reducing uterine involution in postpartum mothers.

Keywords : Auricular Acupressure; Uterine Involution; Puerperal Exercises

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INTRODUCTION

Maternal deaths globally, approximately 25% occur during the antenatal period and another 25% during the perinatal period, while nearly 50% occur during the postpartum period.¹ The postpartum period is defined as the time starting two hours after the delivery of the placenta and continuing up to 42 days after childbirth.² During this period, various physiological changes occur in the uterus, known as uterine involution.^{2,3}

The process of uterine involution begins immediately after the placenta is delivered, resulting from contractions and retraction of the smooth muscles of the uterus.

These contractions affect the speed at which the uterus returns to its pre-pregnancy condition, weighing approximately 60 grams, and the healing of wounds in the uterine pathway, including perineal wounds resulting from episiotomy.⁴

A well-progressing uterine involution process is characterized by a decrease in the height of the uterine fundus accompanied by continuous uterine contractions. Additionally, the uterine fundus will feel firm, and there will be no significant complaints of severe pain in the lower abdomen. The height of the uterine fundus serves as a parameter to determine the uterine involution process⁵. Initially, after the delivery of the placenta, the height of the uterine

fundus is at the level of the umbilicus and will continue to decrease. By the 7th day, the weight of the uterus is around 500 grams, with a fundal height of 7.5 cm, and by the 14th day, the uterus is no longer palpable.⁴

The uterine involution process does not always proceed smoothly, where failure to return to the pre-pregnancy state is termed as uterine subinvolution.⁶ Subinvolution of the uterus is characterized by the uterus's inability to contract properly, which increases the risk of pelvic infection, recurrent endometrial infection, ovarian dysfunction, and bleeding.^{7,8} Subinvolution of the uterus leads to postpartum bleeding, which can result in shock and postpartum death.⁹

Factors that can help accelerate the uterine involution process include early mobilization, age, parity, and early initiation of breastfeeding (EIB). Mobilization that can be done by postpartum mothers includes postpartum exercises, with specific movements during the postpartum period.¹⁰ One of the movements that can be done after delivery is postpartum exercises. Postpartum exercises are a series of movements performed from the first 6 hours postpartum until the seventh day. Several studies have proven that postpartum exercises are beneficial in accelerating uterine involution, reducing lochia discharge, decreasing the risk of postpartum infection, improving circulation, and accelerating breastfeeding function¹¹. *Puerperal exercises* cause vasodilation of blood vessels, ensuring smooth blood circulation and strengthening uterine contractions needed in the uterine involution process. A study conducted on 30 postpartum mothers at the Kampung Baru Community Health Center in Palu City showed a significant difference in the average height of the uterine fundus after regularly performing postpartum exercises from the first day to the sixth day postpartum.¹¹

Another action taken to accelerate uterine contractions in postpartum mothers is using acupressure. Acupressure is one of the complementary therapies performed by applying pressure to the body's meridian points using fingers, elbows, or other tools¹². Acupressure is believed to be beneficial in improving blood circulation and stimulating specific nervous systems according to the pressure applied.¹³

Several forms of acupressure conducted in previous studies Yahya et al., (2020),

combining back massage and acupressure at Lung point (LU 1-RIB 2), Conception vessel point (CV 17), and Small Intestine point (SI 1), showed a significant increase in oxytocin hormone and uterine involution in postpartum mothers. A study combining postpartum exercises intervention and acupressure therapy by applying pressure to Large Intestine point (LI 4), Stomach point (ST 36), and Small Intestine point (SI 1) for 7 (seven) days demonstrated a difference in the average height of the uterine fundus in the postpartum exercise intervention group. The combination of acupressure and postpartum exercises was more effective in reducing uterine involution compared to the group that only performed postpartum exercises or acupressure alone.¹³

One of the recently developed acupressure techniques is auricular acupressure. This technique involves applying pressure to specific points on the ear, including the monaural kidney, spleen, liver, internal genitalia, and central rim points, which stimulate the central nervous system to treat various body disorders¹². In postpartum mothers, auricular acupressure is believed to stimulate the release of endorphins and oxytocin hormones, promoting the entry of calcium ions into cells, thus inducing uterine contractions.¹³

Researchers recently discovered a study conducted by Shu-xin Wang et al., (2021) involving 109 respondents who underwent cesarean section surgery in China. After receiving auricular therapy three times a day for three days, auricular acupressure significantly improved uterine involution in postpartum mothers with cesarean sections as assessed by the height of the uterine fundus.¹⁵

Based on the information search conducted, there hasn't been any intervention therapy involving auricular acupressure for normal postpartum uterine involution. Similarly, studies examining the combination of puerperal exercises and auricular acupressure techniques for normal postpartum uterine involution are lacking. Therefore, the author is interested in conducting this research to make the uterine involution process more effective, thus minimizing the occurrence of postpartum bleeding, which contributes to preventing maternal mortality.

METHOD

This study employs a quantitative design with a quasi-experimental post-test only with control group design. The Quasi-Experimental post-test only with control group design emphasizes the comparison of treatments between two groups: the control group and the experimental group, where the experimental group receives specific treatment, in this case, puerperal exercises and auricular acupressure interventions, while the control group does not receive any special treatment, only puerperal exercises are performed. The sample size consists of 40 postpartum mothers, with 20 respondents in the intervention group and 20 respondents in the control group. The sampling technique used is probability sampling using purposive sampling. The inclusion criteria include normal delivery, willingness of respondents to undergo home visits, and intact earlobes. The study was conducted from April to June 2023. The research locations were two Independent Midwife Practices (IMP) with the highest number of deliveries in Bengkulu City, namely IMP "H" and "S". The intervention started within the first 6 hours postpartum. The treatment given to the intervention group included teaching and performing puerperal exercises (according to SOP) for mothers and conducting auricular acupressure. Pressure was applied alternately to both ears of the mother, targeting the monaural kidney, spleen, liver, internal genitalia, and central rim points using vaccaria seeds and the mother's fingers, with a pressure duration of 1 minute at each point. The control group only underwent puerperal exercises. The intervention for each group was conducted for 7 consecutive days. Puerperal exercises were performed once a day in the morning, and auricular acupressure was performed three times a day. Monitoring to ensure compliance with the intervention was done through home visits on the second and fourth days, while on the third, fifth, and sixth days, it was done via video call. On the seventh day, the height of the uterine fundus was measured using a measuring tape in centimeters (cm). Data collection of maternal characteristics (age, parity, early mobilization, and early breastfeeding initiation) was done through interview methods. Data analysis was performed using Independent T-test with a confidence level of 95%. This study has been approved by the Ethics Commission of

Poltekkes Kemenkes Bengkulu with ethical certificate No.KEPK.BKL/181/5/2023. Ethical standards were maintained throughout the study by obtaining informed consent before written consent and not coercing respondent participation. The researcher also guaranteed respondent identity confidentiality, security, and risk assurance against losses from research actions.

RESULT

Table 1 Characteristics of Respondents Based on Age (n=40)

Variable	Group		P Value
	Intervention (n=20)	Control (n=20)	
Age			
Mean	26,65	25,45	
Median	27,50	25,50	
Min	21	21	0,174
Max	32	30	
SD	3,066	2,373	
CI 95%	25,22-28,08	24,34-26,56	

(Primary Data, 2023)

Based on Table 1, the average age of respondents in the intervention group is 26.65 years with a range of 21-32 years, SD 3.066, and 95% confidence interval (CI) (25.22 to 28.08 years). In the control group, the average age of respondents is 25.45 years with a range of 21-30 years, SD 2.373, and 95% confidence interval (CI) (24.34 to 26.56 years).

Table 2 Characteristics of Respondents Based on Parity (n=40)

Variabel	Group		P Value
	Intervention (n=20)	Kontrol (n=20)	
Paritas			
Mean	1,40	1,35	
Median	1,00	1,00	
Min	1	1	0,752
Max	2	2	
SD	0,503	0,489	
CI 95%	1,16-1,64	1,12-1,58	

(Primary Data, 2023)

Table 2 shows that the average parity of respondents in the intervention group is 1.40 births with a range of 1-2 births, SD 0.503, and 95% confidence interval (CI) (1.61 to 1.64 births). In the control group, the average parity of respondents is 1.35 births with a range of 1-2 births, SD 0.489, and 95% confidence interval (CI) (1.12 to 1.58 births).

Table 3 Characteristics of Respondents Based on Early Mobilization (n=40)

Variabel	Group		P Value
	Intervention (n=20)	Control (n=20)	
Early Mobilization			
Mean	1,755	1,795	0.812
Median	1,700	1,700	
Min	1,0	1,0	
Max	2,7	3,0	
SD	0,4273	0,6108	
CI 95%	1,555-1,955	1,509-2,081	

(Primary Data, 2023)

Based on Table 3, the average early mobilization time for respondents in the intervention group starts at 1.755 hours postpartum, with a range of 1.0-2.7 hours, SD 0.4273, and 95% confidence interval (CI) (1.555 to 1.955 hours). In the control group, the average early mobilization time for respondents starts at 1.795 hours postpartum, with a range of 1.0-3.0 hours, SD 0.6108, and 95% confidence interval (CI) (1.509 to 2.081 hours).

Table 4 Characteristics of Respondents Based on Early Initiation of Breastfeeding (EIBF) (n=40)

Variabel	Group		P Value
	Intervensi (n=20)	Kontrol (n=20)	
IMD			
Mean	14,75	18,50	0,091
Median	15,00	17,50	
Min	5	5	
Max	25	30	
SD	6,382	7,273	
CI 95%	11,76-17,74	15,18-21,82	

(Primary Data, 2023)

Table 4 shows that the average early breastfeeding initiation time for respondents in the intervention group is 14.75 minutes, with a range of 5-25 minutes, SD 6.382, and 95% confidence interval (CI) (11.76 to 17.74 minutes). In the control group, the average early breastfeeding initiation time is 18.50 minutes, with a range of 5-30 minutes, SD 7.273, and 95% confidence interval (CI) (15.18 to 21.82 minutes).

Table 5 The average height of the uterine fundus after intervention in the intervention and control groups at the BPM of Bengkulu City in 2023 (n=40)

Variabel	Group	
	Intervention	Kontrol
TFU Values		
Mean	7,105	7,300
Min	6,8	7,1
Max	7,4	7,5
SD	0,1638	0,1338
SE	0,0366	0,0299
CI 95%	7,028-7,182	7,237-7,363

Based on Table 5, the average value of TFU (Height of Uterine Fundus) in postpartum mothers in the intervention group is 7.105, with a range of 6.8-7.4, SD 0.1638, SE 0.0366, and 95% confidence interval (CI) (7.028 to 7.182). In the control group, the average value of TFU is 7.300, with a range of 7.1-7.5, SD 0.1338, SE 0.0299, and 95% confidence interval (CI) (7.237 to 7.363).

Table 6 The Effect of Puerperal Exercises and Auricular Acupressure on the Height of the Uterine Fundus in Postpartum Mothers (n=40)

	N	Median	p Value
		(min-max)	
TFU			
Intervensi	20	7,100 (6,8-7,4)	0,000*
Kontrol	20	7,300 (7,1-7,5)	

Based on Table 6, it is known that the median value of TFU (Height of Uterine Fundus) in the intervention group is 7.100 (range 6.8-7.4), while in the control group, the median TFU value is 7.300 (range 7.1-7.5). Additionally, the Independent T-test yielded a p-value of 0.000, indicating that there is a difference in the average height of the uterine fundus between the intervention and control groups.

DISCUSSION

1. Description of Respondents' Characteristics

Based on the research results, it is known that the average age of respondents in the intervention group is 26.65 years, with a range of 21 to 32 years, while in the control group, the average age of respondents is 25.45 years, with a range of 21 to 30 years. The age range in this study falls into the reproductive age category. These research findings are consistent with those of Septyara & Hindiarti, (2020) at

Langensari Community Health Center, Banjar City, which indicate that the age range of 20-35 years is considered the reproductive age ideal for the postpartum uterine involution process. During the reproductive age range, the uterine muscles are in prime vitality condition, resulting in more elastic muscle contractions and faster uterine involution due to better regeneration and quality of reproductive organ cells.¹⁷ If childbirth occurs at an unproductive age, i.e., when the mother is under 20 years old, the uterine muscle elasticity is not yet optimal due to immature reproductive organs. Conversely, at age over 35, uterine muscle elasticity begins to decline, which can affect the uterus' ability to contract and slow down the uterine involution process.

The average parity of respondents in the intervention and control groups consists of primiparous (first childbirth) and multiparous (second childbirth) mothers. A study conducted by Retnowati et al., (2022) indicates that parities 1 and 2 are considered safe reproductive ages for childbirth compared to grand multiparity. The elasticity of uterine muscles decreases in grand multiparous women, which affects the speed of the uterine involution process.¹⁹

The average respondents in both the intervention and control groups began early mobilization within the first 1.7 hours postpartum.²⁰ Early mobilization performed by the respondents is by the postpartum maternal activity guidelines, which recommend initiation within the first 2 hours postpartum. Postpartum early mobilization involves engaging in activities as soon as possible, starting with light movements such as limb exercises, followed by turning on the side, sitting up, and eventually standing independently.²¹

Studies by Kusparlina & Sundari have proven a significant relationship between early mobilization and the uterine involution process.^{19,22} Early mobilization increases the oxygen demand of muscles, leading to strong muscle contractions to meet the blood flow.⁵ Consequently, uterine contractions result in faster uterine involution. Based on the average time to initiate Early Breastfeeding Initiation (EBI), in the intervention group, it was initiated at minute 14.47, while in the control group, it was initiated at minute 18.50 postpartum. This study supports the findings of Hobbs et al., (2016), involving 2239 postpartum mothers in Canada with 98.2% of them successfully

initiating EBI with a p-value of <0.001. EBI is conducted within the first hour postpartum and ensures successful breastfeeding within the first 24 hours after birth.²³ EBI is highly beneficial for mothers to accelerate uterine involution and reduce the risk of postpartum bleeding. Furthermore, in 52 postpartum mothers, 95.7% successfully initiated EBI. This study significantly proves the effect of EBI on the uterine involution process (p-value = 0.000), with an odds ratio of 17.600 and a significance level of 95%. This study concludes that mothers who successfully initiate EBI are 17 times more likely to experience uterine involution compared to those who do not successfully initiate EBI.²⁴ The role of early breastfeeding initiation in the uterine involution process is explained by Roesli (2018) when the baby suckles, the smooth muscles in the breast are stimulated. This stimulation is transmitted by nerves to the brain. The brain then signals the posterior pituitary gland to release oxytocin hormone, which is then carried to the smooth muscles in the breast, causing the breasts to contract and release breast milk. Oxytocin hormone produced by the pituitary gland also enters the bloodstream towards the smooth muscles in the uterus, stimulating uterine contractions, and thereby facilitating the smooth discharge of lochia as one of the parameters of faster uterine involution with the presence of EBI.²⁵

2. Difference in Mean Fundal Height of the Uterus (TFU)

Based on the research results, there was a difference in the uterine involution process measured using the height of the uterine fundus between the intervention group receiving a combination of puerperal exercises and auricular acupressure and the control group receiving puerperal exercises only. The analysis showed that the average decrease in the height of the uterine fundus in the intervention group was 7.100 cm, which was smaller than the average of 7.300 cm in the control group, with a p-value of 0.000. This value demonstrates that the combination of puerperal exercises and auricular acupressure significantly influences the reduction in uterine involution in postpartum mothers.

The results of this study are consistent with similar research conducted by Shu-xin Wang et al., (2021) which analyzed 109

postpartum mothers after cesarean section surgery in China. After auricular acupressure therapy three times a day for three days, the study found that at 42 days postpartum, the uterine size was 6.3 centimeters smaller than the control group (95% confidence interval (CI) - 11.6 to -0.09, $p < 0.01$).¹⁵ In the study by Shu-xin Wang et al., it was also explained that on the third day, the total reduction in uterine involution measured by the height of the uterine fundus in the intervention group was an average of 4.2 cm (SD: 2.1), while in the control group, it was an average of 2.8 cm (SD: 1.4), illustrating a difference in the speed of uterine involution between the intervention and control groups. Although the subjects in Shu-xin Wang et al.'s study were postpartum mothers who underwent cesarean section, while the study in this research was conducted on subjects of normal postpartum mothers, both studies indicate that in the intervention group, uterine involution occurred more rapidly compared to the control group.

Auricular acupressure intervention involves applying pressure to specific points on the monaural kidney, spleen, liver, internal genitalia, and central rim located on both earlobes. Pressing on these points is believed to stimulate the release of endorphins and oxytocin hormones, which promote the influx of calcium ions into cells, leading to uterine contractions¹³. These uterine contractions are crucial for the uterine involution process⁵.

A study on auricular acupressure was also conducted on 90 pregnant women at Kowsar Hospital, Iran, providing evidence that auricular acupressure applied to points zero, genital, shen men, thalamic, and uterus 1 and 2 reduced labor pain. The analysis results demonstrated a difference in the average pain scores between the groups, with the labor pain intensity in the auricular acupressure group significantly lower than that in the control group.²⁶ This study proves that auricular acupressure is also considered effective in reducing labor pain.

The study conducted in this research utilized a combination of auricular acupressure with puerperal exercises. The intervention of puerperal exercises has been well-established through previous studies. Consistent with research on 30 respondents in Palu after undergoing puerperal exercises for six days, it was found that there was a difference in the average decrease in the height of the uterine fundus. In the intervention group, the decrease

in the height of the uterine fundus was 0.9 cm, while in the control group, it was 7.3 cm.¹¹

Similarly, a study combining puerperal exercises and oxytocin massage on 60 postpartum mothers showed differences in the average height of the uterine fundus on the sixth day. In the intervention group, the average uterine fundus height was 7.85 cm (SD: 0.95), while in the control group, it was 9.27 cm (SD: 0.86), with $p=0.0001$. The results of this study indicate a significant difference in the average height of the uterine fundus between the intervention and control groups.²⁷

Puerperal exercises are beneficial in accelerating uterine involution, lochia discharge, reducing the risk of postpartum infections, improving circulation, and speeding up lactation function¹³. The process of uterine involution can be accelerated with puerperal exercises, which cause the uterine muscles to contract and retract, resulting in uterine shrinkage.²⁸

A study involving 45 normal postpartum mothers demonstrated a significant difference ($p=0.000$) in the average height of the uterine fundus on the seventh day. In the combined intervention group of puerperal exercises and acupressure, the average height was lower at 2.70 cm (SD=1.236), compared to 3.58 cm (SD=1.269) in the acupressure-only group without puerperal exercises and 4.95 cm (SD=1.575) in the puerperal exercises-only group. This study proves that the intervention combining puerperal exercises and acupressure is more effective in reducing the height of the uterine fundus compared to puerperal exercises alone.¹³

In terms of uterine size, typically on the seventh day postpartum, the weight of the uterus ranges around 500 grams, with a fundal height of 7.5 cm. In the research conducted, the uterine involution measurement after intervention on the seventh day was 7.1 cm. This result indicates that in the intervention group, the process of uterine involution occurs more rapidly.

CONCLUSION

In this study, it was found that puerperal exercises and auricular acupressure are effective in accelerating the process of uterine involution in postpartum mothers. This indicates the importance of integrating both interventions in postnatal care to improve maternal health and reduce the risk of

postpartum complications. For further research, it is recommended to expand the sample size and explore the long-term effects of both interventions. This will help strengthen the evidence regarding the benefits of puerperal exercises and auricular acupressure in the context of postnatal care.

CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

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