

ORIGINAL RESEARCH

The Effect of Pelvic Rocking Exercise with a Birth Ball and SP6 Acupressure on Duration of the First and Second Stage of Labor



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Abstract

Background: Long duration of labor increases the pain that a mother experiences. Several non-pharmacological methods, such as pelvic rocking exercises and SP6 acupressure, have been discovered to reduce pain and accelerate labor duration. It needs to be clarified which of the two methods is more effective.

Purpose: This study aimed to assess the effectiveness of pelvic rocking exercise with a birth ball and SP6 acupressure in shortening the duration of the active phase in the first and the second stage of labor.

Methods: This study used a quasi-experimental design involving 64 mothers in the first stage of normal delivery who were recruited using propensity score matching sampling. The participants were divided into two intervention groups (the pelvic rocking exercise with a birth ball and SP6 acupressure). Each respondent in the two intervention groups was monitored for progress of labor during the active phase in the first stage using a partograph starting from cervical dilatation of 4 cm to 10 cm. The duration of the second stage was assessed by calculating the length of time from cervical dilatation of 10 cm to the delivery of the entire baby. The Mann-Whitney U test was performed to assess the difference between the two interventions in the two stages of labor assessed.

Results: There was a difference in the duration of labor in the first stage ($p=0.00$) and the second stage ($p=0.001$) between the groups given the pelvic rocking exercise with a birth ball and the SP6 acupressure. The pelvic rocking exercise with a birth ball was found to be more effective in shortening the duration of the active phase in the first stage (Mean rank=19.83) and the second stage of labor (Mean rank=24.56) compared to SP6 acupressure (Mean rank of the first stage=45.17 and Mean rank of the second stage=40.44).

Conclusion: The pelvic rocking exercise was found to be more effective compared to SP6 acupressure in shortening the duration of the active phase in the first and the second stage of labor. Pelvic rocking exercise can be implemented to help accelerate labor duration so that mothers can feel more comfortable during the labor.

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1. Introduction

Understanding normal and natural childbirth is highly important for every woman during childbearing. In natural childbirth, women can decide the birth process that they want (Bringedal & Aune, 2019). However, some women are afraid of natural childbirth due to the pain and the long time of waiting until the baby is delivered (Abdollahpour & Motaghi, 2019). Childbirth is a spontaneous process of expelling the baby naturally without any interventions on the condition (Yousefzadeh et al., 2016). In addition, vaginal delivery is cost-effective, requires a short duration of treatment, and has a low risk of bleeding and infection and the newborn (Sultan et al., 2020; Walsh et al., 2013; Zakerihamidi et al., 2015).

However, the increasing trend in a cesarean section has continued in the last few decades, from 6.7% in 1990 to 19.1% in 2014 (Wyatt et al., 2021). This indicates that there has been a decrease in normal vaginal delivery in recent years (Bhandary, 2017; Borem et al., 2020). The increase in the average trend of cesarean sections also occurred in Indonesia, from 2% in 1991 to 16% in 2012 (Wyatt et al., 2021). Even though most of the causes of cesarean sections were due to obstetric complications, the concern about excessive pain during delivery and inability to wait for normal delivery, which usually takes quite a long time, also caused an increase in cesarean

sections in those times (Sungkar & Basrowi, 2020; Sungkar et al., 2019). Due to the discomfort women experience during the first stage of the active phase of labor and the long process of the second stage of labor, many pregnant women choose to have a cesarean section without a plan or a medical reason (Sungkar & Basrowi, 2020; Zaky, 2016). Cesarean section has a negative impact compared to vaginal delivery, which includes respiratory problems in neonates, the risk of having a hysterectomy and placenta accreta in subsequent deliveries, and longer hospitalization time (Câmara et al., 2016).

In recent years, many methods of non-pharmacological therapy as alternative therapies have been developed to be used by mothers during labor (Aswitami & Septiani, 2020; Novelia et al., 2019; Osório et al., 2014; Yeung et al., 2019). The utilization of non-pharmacological methods in the labor process, such as reducing pain, accelerating the descent of the lowest part of the fetus, and accelerating cervical dilatation, has been widely practiced (Aswitami & Septiani, 2020; Calik & Komurcu, 2014; Novelia et al., 2019). Research on types of non-pharmacological methods that reduce labor pain, accelerate cervical dilatation, and increase uterine contractions is classified as doing the pelvic rocking exercise (Zaky, 2016; Farrag, 2018), and acupressure (Hulya & Ceber, 2020).

The pelvic rocking exercise with a birth ball is an effective way to relax the pelvic area by expanding the size of the pelvic cavity, keeping the mother in an upright position that increases the chance of opening the cervix and stimulates the baby to descend into the pelvic inlet (Grenvik et al., 2021; Mathew et al., 2012; Ulfa, 2021; Zaky, 2016). This exercise is done by rocking the pelvis over a ball and slowly swinging the hips back and forth, to the right and left, and in a circle. Midwives have taught pregnant women how to use a birth ball during the antenatal period and encouraged mothers to practice it during the active phase of the first stage of labor (Grenvik et al., 2021; Ulfa, 2021; Zaky, 2016). A quasi-experimental study in Egypt found that the group using a birth ball during the first stage of labor showed improvements in cervical dilatation and accelerated descent of the fetal head, thus shortening the time between the first and the second stage of labor (Mathew et al., 2012).

On the other side, SP6 acupressure is a traditional Chinese therapy that uses hands to massage certain body parts at acupuncture points. SP6 acupressure is administered by specially trained midwives or maternity nurses (Mollart et al., 2015; Hulya & Ceber, 2020). SP6 acupressure can help accelerate labor and overcome some problems around female reproductive organ disorders (Najafi et al., 2018; Wong et al., 2010). The previous study showed that the duration of the active labor was significantly shorter ($p < 0.001$) in the group receiving acupressure than the control group, and there was also an alleviation in the labor pain (Calik & Komurcu, 2014). Furthermore, a meta-analysis of 10 RCTs studies stated that acupressure could significantly ease the pain during the first stage of labor (Raana & Fan, 2020), and another study of RCTs stated that SP6 acupressure significantly shortened the duration of the first stage of labor in the intervention group compared to the group without intervention (Hulya & Ceber, 2020).

Both types of non-pharmacological methods in the childbirth process have proven to help alleviate labor pain and shorten delivery time. Therefore, it is necessary to evaluate which method is more effective in shortening the duration of labor in the active phase of the first and second stages of labor. There has been no research that compares these two types of interventions, so the findings of this study are expected to be applicable as the basis for determining the more effective interventions for mothers in the first stage of the active phase of labor. Accordingly, this study aimed to assess the difference in the effectiveness of the pelvic rocking exercise with a birth ball and SP6 acupressure on the duration of the first stage of the active phase and the second stage of the birth process.

2. Methods

2.1 Research design

This study used a quasi-experimental method with a two-group comparison design. This study compared two different interventions in two groups of mothers during the first stage of labor who were present in the delivery room of a maternity home during the period of the study (6 months) with regular uterine contractions. The first group consisted of mothers who were given a pelvic rocking exercise with a birth ball and the second group consisted of mothers who were given SP6 acupressure.

2.2 Setting and samples

This study was conducted in a maternity clinic in Depok, West Java, Indonesia. The number of samples was calculated out using a formula for comparing two groups for a quasi-experimental study (Charan & Biswas, 2013), which obtained 32 mothers for the group that was given the pelvic rocking exercise with a birth ball and 32 mothers for the group that underwent SP6 acupressure. The sampling method was conducted using a propensity score matching technique in which each group was selected based on the characteristics relevant to both groups (White & Sabarwal, 2014). The characteristics that were matched in this study were pregnant women with ≥ 37 weeks of gestation, currently in the early active phase of the first stage of labor with cervical dilatation of 4-5 cm, the presentation of the lowest part of the fetus was the head, intact membranes, no complications of pregnancy and childbirth, mother and fetus were in good condition. Mothers with multiple pregnancies, the interpretation of fetal weight is ≥ 4000 g or < 2500 g, and diagnosed with cephalopelvic disproportion were not considered.

As mentioned earlier, the sample selection was done using the propensity score matching technique, which took all the existing samples during the research period and was not done randomly. Determination of which mothers go into which group was done by drawing lots. Mothers who got an odd number joined the pelvic rocking exercise group, and those who got an even number went to the SP6 acupressure group. The respondents were selected when they were in comfortable condition and did not have uterine contractions. The participants selected with this method had given their consent and had been informed about the intervention that would be carried out during the antenatal period. They have also understood the impacts of both types of intervention.

2.3 Intervention

The intervention group with the pelvic rocking exercise using a birth ball was accompanied by a midwife who had been trained in facilitating mothers to do this exercise. The mother performed this exercise during the active phase in the first stage of labor when the cervical dilatation was 4 to 8 cm in or outside uterine contractions. This exercise was done for 10-20 minutes per session every hour until cervical dilatation was 8 cm. Assessment of cervical dilatation was also carried out by a midwife who facilitated the exercise. Meanwhile, the other intervention group was given SP6 acupressure by a trained midwife. The midwife gave the mother a massage or pressure when cervical dilatation reached 4 cm to 8 cm. The process of applying pressure to SP6 acupressure points was taken place for 3-5 minutes at the time of uterine contractions until the cervix dilated to 8 cm. SP6 acupuncture points are acupuncture areas on the body located on the shins on the inside of the ankles, 4 fingers above the medial malleolus behind the posterior tibia, known as Sanyinjiao points (Akbarzadeh et al., 2013; Najafi et al., 2018). Assessment of cervical dilatation was also carried out by the same midwife.

2.4 Measurement and data collection

Each respondent in the two intervention groups was monitored for labor progress during the active phase in the first stage using a partograph starting from cervical dilatation of 4 cm to 10 cm. In addition, the condition of the mother and the fetus was also assessed and monitored by a partograph. The duration of the second stage was assessed by calculating the length of time from cervical dilatation of 10 cm to the delivery of the entire baby. For primiparity, the duration of the normal active phase of the first stage of labor is 3.3-6.8 hours, and the second stage of labor is 44-106 minutes. As for multiparity, the average duration of the first stage of the active phase is 1.5-3.5 hours, and the duration of the second stage is 18-46 minutes (Chen et al., 2018; Hildingsson et al., 2015).

2.5 Data analysis

Characteristics of respondents are presented in proportions. The difference test for each proportion was carried out using the Chi-square test. Data normality testing was conducted using the Kolmogorov-Smirnov test. It aimed to determine the type of test to be used. From the results of the Kolmogorov-Smirnov test, it was found that the data was not normally distributed (p -value < 0.05). To find out the difference between the effectiveness of the Pelvic Rocking Exercise and SP6 Acupressure on the duration of active phase in the first stage and the second stage of labor, a Mann-Whitney U test was conducted. This test was used as a non-parametric test to compare the

outcomes of two independent groups. A non-parametric test is used when the outcomes are not normally distributed, and the samples are small. The significant difference was assessed from $p < 0.05$. All data were analyzed using SPSS 21 (IBM® SPSS® Statistics 21).

2.6 Ethical considerations

This research was approved by the Health Research Ethics Committee of the Faculty of Medicine, Muhammadiyah University of Jakarta with a reference number 104/PE/KE/FKK-UMJ/VI/2021. All selected respondents showed their agreement to participate in this study by signing the informed consent. They were informed about the activities of the study and agreed to go either with the pelvic rocking exercise or SP6 acupressure. All respondents have the right to withdraw their consent at any time and leave the process of study.

3. Results

3.1 Demographic characteristics of the respondents

Table 1 describes the characteristics of 64 participants who were divided into two intervention groups. Based on Table 1, the intervention group that was given the pelvic rocking exercise using a birth ball has the following characteristics: 91% had completed at least senior high school, 97% were aged 20-35 years old, 59% had primiparity, and 50% were Javanese. Meanwhile, in the intervention group that was given SP6 acupressure, it was found that 91% had completed senior secondary education, 91% were 20-35 years old, 59% were multiparous, and 50% were Javanese. The significant difference in the proportion of respondents' characteristics based on the duration of the first stage of labor was education and parity ($p = 0.05$). Meanwhile, none of the respondent characteristics were associated with the duration of the second stage of labor ($p > 0.05$).

Table 1. Respondents' characteristics

Characteristics	Intervention Groups				p-value for 1 st stage of labor*	p-value for 2 nd stage of labor*
	Pelvic rocking exercise with a birth ball (n=32)		Acupressure SP6 (n=32)			
	f	%	f	%		
Education						
≥ Senior high school	32	100	29	91		
≤ Junior high school	0	0	3	9	0.03	0.78
Age (year)						
20 – 35	31	97	29	91		
<20 and >35	1	3	3	9	0.75	0.06
Parity						
Multiparity	13	41	19	59		
Primiparity	19	59	13	41	0.01	0.36
Ethnic						
Betawi	0	0	3	9		
Java	16	50	16	50		
Sundae	6	19	7	22		
Minang	7	22	1	3		
Melayu	2	6	1	3		
Others	1	3	4	13	0.24	0.11

*Chi-square test: $p < 0.05$ was considered as a statistically significant difference

3.2 Duration of active phase in the first stage and second stages of labor

Based on Table 2, during the active phase in the first stage of labor, each intervention provided a different duration from 4-5 cm to complete cervical dilatation. Based on the table, the majority of respondents given the pelvic rocking exercise with a birth ball intervention passed the first stage of labor within 3 hours (53.1%) (Mean=2.92), while in the acupressure group, it lasted for 6 hours (37.5%) (Mean=5.14). Most respondents in the intervention group with the pelvic rocking exercise passed the second stage of labor within 20 minutes (31.2%) (Mean=18.16), while respondents in the acupressure group was 21.9% at a duration of 15 to 25 minutes (Mean=24.91).

Table 2. The duration of the active phase of the first stage and second stage of labor in both intervention groups

Parameters	Pelvic rocking exercise with a birth ball		SP6- acupressure	
	f	%	f	%
Duration of first stage of active phase (hour)				
1.5	1	3.1	0	0.0
2	5	15.6	0	0.0
2.25	1	3.1	0	0.0
2.5	2	6.2	1	3.1
2.75	1	3.1	0	0.0
3	17	53.1	4	14.5
3.5	0	0.0	2	6.2
4	4	12.5	6	18.1
5	1	3.1	1	3.1
5.25	0	0.0	1	3.1
5.5	0	0.0	1	3.1
6	0	0.0	12	37.5
6.25	0	0.0	1	3.1
6.5	0	0.0	1	3.1
9	0	0.0	1	3.1
9.5	0	0.0	1	3.1
Total Number	32	100	32	100
Mean	2.92		5.14	
Duration of second stage of labor (minutes)				
10	9	28.1	0	0.0
13	2	6.2	0	0.0
15	5	15.6	7	21.9
17	0	0.0	1	3.1
20	10	31.2	5	15.6
22	1	3.1	0	0.0
23	1	3.1	2	6.2
25	1	3.1	7	21.9
30	0	0.0	2	6.2
32	0	0.0	1	3.1
33	0	0.0	1	3.1
34	0	0.0	1	3.1
35	0	0.0	2	6.2
40	3	9.4	2	6.2
45	0	0.0	1	3.1
Total Number	32	100	32	100
Mean	18.16		24.91	

3.3 Differences in duration of active phase in the first stage of labor of respondents

Based on Table 3, the mean duration of the active phase in the first stage in the intervention group that was given the pelvic rocking exercise with a birth ball was 2.92 hours. In comparison, the group with the intervention of SP6 acupressure appeared to have a longer duration (Mean= 5.14 hours). Table 3 shows that the mean rank of the pelvic rocking exercise with a birth ball group was 19.83, while the mean rank of the SP6 acupressure group was 45.17. There was a significant difference regarding the duration of the active phase in the first stage of labor between the intervention group given the pelvic rocking exercise, and the intervention group given SP6 acupressure ($p=0.000$; $p<0.05$).

In addition, based on Table 3, there was a difference in the duration of the second stage of labor between the intervention group performing the pelvic rocking exercise and the intervention group that was given acupressure ($p=0.001$). The group with the pelvic rocking exercise had a mean rank of 24.56, while the group that was given acupressure had a mean rank of 40.44.

Table 3. Differences in the duration of first stage of active phase and second stage of labor in the respondents from each intervention group

Score category		Intervention group	
		Pelvic rocking exercise with a birth ball	SP6-acupressure
Duration of the first stage of labor in the active phase (hour)	Mean	2.92	5.14
	Median	3.0	5.75
	Minimum score	1.50	2.50
	Maximum score	5	9.50
	Mean Rank	19.83	45.17
	Sum of Rank	634.50	1,445.50
	P-value	<0.001*	
Duration of the second stage of labor (minutes)	Mean	18.16	24.91
	Median	17.50	25.00
	Minimum score	10	15
	Maximum score	40	45
	Mean Rank	24.56	40.44
	Sum of Rank	40.44	1,294.00
	P-value	0.001*	

* $p < 0.05$ was considered a significant difference

4. Discussion

This study aimed to examine the effectiveness of the pelvic rocking exercise with a birth ball and SP6 acupressure in shortening the duration of the active phase in the first and the second stage of labor. In this study, the average duration of the active phase in the first stage of labor was shorter in the intervention group that performed the pelvic rocking exercise with a birth ball compared to the group with SP6 acupressure intervention. The pelvic rocking exercise with a birth ball was more effective in shortening the active phase in the first labor stage than the SP6 acupressure. The duration of the first and the second stage of labor gives quite a lot of meaning to all childbearing mothers. The long duration in the first and the second stage of labor gives various feelings of anxiety and trauma to face the next labor process due to the pain that will continue until the labor process (Akbarzadeh et al., 2013).

This study showed that the duration of the active phase in the first stage, either with the pelvic rocking exercise or with SP6 acupressure intervention, was shorter compared to the duration of normal labor in the active phase. This result is in line with a study by Neal et al. (2010), where the average duration in the active phase in the first stage of normal labor was 6-13 hours. Furthermore, the result of this study showed that the pelvic rocking exercise was more effective in reducing the duration of the active phase in the first stage of labor compared to SP6 acupressure. It was also consistent with a quasi-experimental study in Alexandria involving 80 pregnant women, which found that the pelvic rocking exercise was effective in accelerating cervical dilatation and the descent of the lowest part of the fetus (Zaky, 2016). In addition, one of the systematic reviews and meta-analysis studies of 5 RCTs research stated that there was a significant association between the use of birth balls during the first stage of labor and the reduction of the duration of the active phase in the first stage of labor (Makvandi et al., 2019). The use of birth balls was effective when the mother was in an upright position and moved her pelvis freely following gravity. This activity will help accelerate the descent of the fetal head and increase uterine contraction (Makvandi et al., 2019; Delgado et al., 2019). In accordance with the result of one systematic review of randomized and semi-randomized trials from the Cochrane Library, the upright position was the best position for mothers in the first stage of labor, which was 1 hour 20 minutes faster than other positions (Lawrence et al., 2013).

On the other hand, this study also found that giving SP6 acupressure during the active phase in the first stage of labor also shortened the duration of this phase compared to the duration of the first stage in normal labor (Neal et al., 2010; Hildingsson et al., 2015). However, compared to the pelvic rocking exercise performed by pregnant mothers, the effectiveness of SP6 acupressure was lower. SP6 acupressure can increase uterine contractions due to applying pressure on SP6 acupressure points and increase energy density in the uterus which intensifies muscle activities and concentration of oxytocin (Akbarzadeh et al., 2013). Several previous RCTs studies also revealed that pressing SP6 acupressure points could shorten the first stage of labor (Akbarzadeh

et al., 2013; Hulya & Ceber, 2020; Yesilcicek Calik & Komurcu, 2014). The result of this study was consistent with a meta-analysis of 16 research articles examining the impact of acupressure on the duration of labor and pain, which found that there was a reduction in the length of the first stage among pregnant women who received SP6 acupressure (ORs=-.99, CIs=-1.39,-0.39) (Najafi et al., 2018). In addition, another meta-analysis study using 13 research articles on the effect of acupressure on labor, 10 articles discussing its impact on the active phase in the first stage of labor, found that acupressure reduced the length of time of labor compared to the group not given acupressure ($p<0.001$), although the results of this meta-analysis did not explain the type of acupuncture applied (Makvandi et al., 2016).

In our study, pregnant mothers who performed the pelvic rocking exercise with a birth ball during the active phase in the first stage of labor until complete cervical dilatation passed the second stage with a shorter duration than pregnant mothers who underwent SP6 acupressure during the first stage of labor. Previous studies have been conducted separately and have yet to compare these two types of interventions (Hulya & Ceber, 2020; Makvandi et al., 2016; Makvandi et al., 2019; Sheishaa et al., 2019). The pelvic rocking exercise with a birth ball could help accelerate the descent of the lowest part of the fetus along with an increase in uterine contraction due to the mother's position that was adjusted to gravity and pelvic movements (Delgado et al., 2019; Makvandi et al., 2019; Mathew et al., 2012). Several previous studies found that there was an increase in uterine contraction and accelerated descent of the fetal head by doing the pelvic rocking exercise with a birth ball during the first stage of labor (Kwan et al., 2011; Wang & Lu, 2020), thus shortening the duration of the second stage because the head was already on the pelvic floor. The short delivery time passed will help the mother be more comfortable and avoid more prolonged pain (Sharifipour et al., 2022). Meanwhile, uterine contraction did increase among pregnant women who received SP6 acupressure, but it did not directly affect the descent of the baby's head in the mother's pelvic cavity. Applying pressure to SP6 acupressure points would stimulate an increase in uterine contraction that would accelerate cervical dilatation and speed up the labor; however, it did not directly affect the acceleration of the descent of the fetal head in the pelvic cavity (Najafi et al., 2018). Even so, a quasi-experimental study on 150 primiparous mothers in Iran stated that the pressure applied to SP6 acupressure points could significantly shorten the length of the first stage of labor but not the second stage (Akbarzadeh et al., 2013)

5. Implications and limitations

This study has important implications in that the results are helpful for midwives, maternity nurses, or other healthcare workers to determine the more effective intervention according to the mother's condition in the first active stage of labor. In addition, training pregnant women during the gestation period on how to do pelvic rocking exercises is essential so that they can do well when they enter labor. This study has several strengths, including the fact that this research is a quasi-experimental study that used reasonably strict criteria to select the samples so that respondent bias can be reduced. However, some limitations of this study should be noted. Several factors that can affect labor pain need to be considered, such as the role of the closest person during the delivery process, which affects the mother's psychological condition in the first and the second stages of labor. In addition, it is necessary to increase the number of samples to strengthen the results statistically.

6. Conclusion

In conclusion, this study found that the two methods applied (the pelvic rocking exercise with a birth ball and SP6 acupressure) during the first stage of the active phase and the second stage of labor showed to be effective in shortening the duration of the active phase in the first and the second stage of labor. However, the pelvic rocking exercise with a birth ball was more effective than the SP6 acupressure that was given in the same period. The pelvic rocking exercise is easy to do (mother can use her own strength) and it does not require a midwife's special skills to intervene compared to SP6 acupressure in the context of shortening the duration of the first and the second stage of labor. Using a more effective method will reduce the length of labor and the time of experiencing labor pain, and the mother will be more comfortable.

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Author contribution

KN was involved in the conceptualization and research design, interpreted the results, wrote the original draft of the manuscript and revised the manuscript. DW conceptualized and designed this research, interpreted the results, reviewed and revised the manuscript. FZ performed data analysis and interpreted the results, reviewed and revised the manuscript. GT performed data analysis (software), interpreted the results, reviewed and revised the manuscript. EN performed data analysis, reviewed and revised the manuscript. All authors have approved the final manuscript and agree on all that has been done.

Conflict of interest

The authors have no financial relationships relevant to this article to declare. All authors have no conflicts of interest to disclose.

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