The Effect Of Birthing Ball Exercise On The Duration Of Active Phase 1 In Laboring Women

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Abstract. Birthing ball exercise is a maternity ball that serves as a physical therapy to assist the progress of active phase I labour in labouring women. The purpose of this study was to determine the effect of birthing ball exercise on the duration of active phase I labour in labouring women. This study employed a quasi-experimental design with a posttest-only control group. The research was conducted at PMB Majalengka Regency in November 2023 - April 2024. The sample size was 44 respondents with purposive sampling technique. The research group was divided into 2, namely the experimental group of 22 respondents using birthing ball exercise and the comparison group of 22 respondents not using birthing ball exercise. Both groups were observed with a partograph. The exercise was performed during the active phase of the first stage, when cervical dilation ranged from 4 to 8 cm, for 10 to 20 minutes per session every hour until the cervical dilation reached 8 cm. The results indicated that the duration of active phase I in the experimental group (birthing ball exercise) was 3.14 hours, which was shorter than the 4.08 hours observed in the control group. There is an effect of birthing ball exercise on the duration of active phase I in labouring mothers p value 0.003 ($p<0.05$). Birthing ball exercise significantly shortens the duration of kala I active phase in labouring mothers. The birthing ball exercise is simple to perform, requires no special skills, and has been proven effective in reducing the duration of labor.

Keywords: Birthing ball exercise, labouring women, quasi-experimental

1 Introduction

Labour is the process of delivering all the products of conception, including the fetus and placenta. from the intrauterine environment to the extrauterine environment. Labour is said to be normal if the process lasts enough months (37 - 42 weeks) without complications [1]. The labour process begins with uterine contractions that cause the opening of the cervix. This process is called the first stage of labour. The first stage of labour is defined as the beginning of contractions that can cause the opening of the cervix and ends with complete opening. The first stage of labour consists of a latent phase and an active phase. The latent phase of the first stage of labour is a period in which the cervix gradually dilates up to 3 cm over approximately 7 to 8

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hours. In contrast, the active phase begins when cervical dilation reaches 4 cm and progresses to 10 cm over a span of 6 hours. This phase is further divided into three stages: 2 hour acceleration period, 2 hour maximum dilation period, and 2 hour deceleration period. The first stage of labour lasts approximately 13 to 14 hours in primigravida, whereas in multigravida, it typically takes around 6 - 7 hours [2].

According to the World Health Organisation (WHO), more than 85% of births take place normally, while 15%-20% of births are accompanied by pregnancy diseases and complications, with 94% of maternal deaths occurring in developing countries [3]. The Basic Health Research Report (2019) identified the main causes of childbirth complications, including premature rupture of membranes (5.6%), prolonged labour (4.3%), suboptimal fetal position (3.1%), cord entanglement (2.9%), hypertension (2.7%), bleeding (2.4%), and other causes (4.6%) [4]. From the data above, prolonged labour is a contributing factor to maternal mortality, though its occurrence is lower compared to bleeding and hypertension. If prolonged labour is not promptly managed or prevented, it can lead to complications and emergencies for both mothers and babies. In primigravida, the first stage of labour lasts longer than in multigravida due to differences in the process of cervical dilatation. In primigravida, complete cervical thinning occurs at the beginning of labour followed by opening, whereas in multigravida cervical thinning and opening occur simultaneously. Duration of labour can affect maternal fatigue and physical decline during labour [5]. Reducing the duration of stage I is a key intervention, and birthing ball exercises have proven to be an effective tool for achieving this. The use of birthing balls plays an important role as a non-pharmacological method, as it can help promote a positive birth experience by achieving good labour progress [6]. Studies report birthing ball exercises can reduce labour pain, promote faster cervical dilation and strengthen uterine contractions in women during labour [7], [8].

Birthing ball exercises are a technique used to support labor during the first stage. However, this method is not widely recognized by the public and remains unfamiliar despite its effectiveness in accelerating the labor and birth process. The use of a birth ball integrates yoga movement techniques, particularly pelvic rocking, which helps relax the pelvic muscles, aiding in the expansion of the birth canal and easing the labor process [8]. Exercises using a birthing ball help align the fetus's longitudinal axis with the birth canal, which can reduce the length of the first stage of labor and facilitate vaginal delivery [9]. This method facilitates an upright position during labour which encourages the descent of the fetus aided by gravity as well as an increase in pelvic dimensions [10].. Research by Kurniawati (2017) showed that mothers who performed birthing ball exercises experienced shorter first stage of labour, low analgesic use, and low incidence of cesarean section [11].Therefore, this study aims to explore the effect of birthing ball exercises on the duration of active phase I in labouring women.

2 Method

This study used a quasi-experimental method with a posttest only comparison group design. The research was conducted at PMB Majalengka Regency, West Java in November 2023 - April 2024. The sample consisted of 44 respondents selected using a purposive sampling method. The research group was divided into 2, namely the experimental group of 22 respondents using birthing ball exercise and the comparison group of 22 respondents not using birthing ball exercise. Both groups were observed with a partograph.

The sampling method employed a propensity score matching technique, ensuring that each group was selected based on relevant characteristics for both groups [12]. The study included pregnant women with a gestational age of 37 weeks or more who were in the active phase of the first stage of labor, with cervical dilation of 4-5 cm, head presentation, intact amniotic fluid, and no complications during pregnancy or childbirth. Both the mother and fetus were in good health. Mothers with multiple pregnancies, fetal weight outside the 2500-4000 g range, or cephalopelvic disproportion were excluded. Respondents were chosen when they were in a comfortable state and not experiencing uterine contractions.

The exercise is to ask the mother to sit on the ball then swing the pelvis forwards and backwards, to the right side and to the left side, rotating the pelvis clockwise like a circle and hugging the ball in a kneeling position. Mothers perform this exercise during the active phase of labour when cervical dilatation is 4 - 8 cm within or outside uterine contractions. The exercise is carried out for 10 to 20 minutes per session, every hour, until cervical dilation reaches 8 cm. Midwives and researchers who supervised the exercise assessed the cervical dilation. Each respondent was monitored for progress of labour during the active phase using a partograph, starting from 4 cm to 10 cm cervical dilatation. Maternal and foetal conditions were also assessed and monitored through the partograph. The duration of the normal active phase of labour in primiparity was 3.3-6.8 hours, while for multiparity it was 1.5-3.5 hours [13], [14].. Data analysis used Wilcoxon test and the significance level was set at $p<0.05$. This study was approved by the Health Research Ethics Committee with the ethics permit number of the Faculty of Pharmacy, YPIB University Number: 275/KEPK/EC/XI/2023.

3 Result and Discussion

3.1. Result

Based on table 1, the characteristics of the respondents studied include age, parity status, and occupation showed that the p-value <0.05 ($p<0.05$) means that there are significant differences in these characteristics.

Table 1. Characteristics of respodents

Characteristics	Intervention group			Control group			p value
	n	%	mean±SD	n	%	mean±SD	
Age							
<20 th	0	0	31,6818 ± 2,58910	0	0	32,2727 ± 3,18002	0,003 ±0,045
20-35 th	22	100%		18	81,82%		
>35 th	0	0		4	18,18%		
Total	**22**	**100%**		**22**	**100%**		
Parity							
Primiparity	11	50%	1,5455 ±0,50965	11	50%	1,5455 ± 0,50965	0,003 ± 0,045
Multiparity	11	50%		11	50%		
Total	**22**	**100%**		**22**	**100%**		
Occupation							
Not Working	11	50%	1,5000 ± 0,51177	16	72,73%	1,3864 ±0,45584	0,003 ± 0,045
Employed	11	50%		6	27,27%		
Total	**22**	**100%**		**22**	**100%**		

Table 2 shows that most of the mothers in the intervention group had a normal duration of the first stage, 21 people (95.45%) and most of the control group had an abnormal duration of the first stage, 19 people (86.36%).

Table 2. Frequency distribution of intervention group and control group

Duration of active phase I	**Intervention group**		**Control group**	
	f	%	f	%
Normal	21	95,45%	3	13,64%
Primiparity (3,3 - 6,8 hour)	11	4,55	2	31,82
Multiparity (1,5 - 3,5 hour)	10	54,54	1	22,73
Abnormal	1	4,55	19	86,36
Primiparity (3,3 - 6,8 hour)	0	36,36	9	18,18
Multiparity (1,5 - 3,5 hour)	1	4,55	10	27,27
Total	**22**	**100%**	**22**	**100**

Table 3 shows the results of the data normality test in this study were not normally distributed, the p value in the intervention group was 0.003 and the control group was 0.045 ($p < 0.05$), so the statistical test used the Wilcoxon test.

Table 3. Data normality test

	Shapiro-Wilk		
Group	Statistic	df	Sig.
Intervention	0,846	22	0,003
Control	0,909	22	0,045

Based on table 4, the average length of active phase I in the intervention group using birthing ball exersice was 3.14 hours while the control group that did not use birthing ball exersice was 4.08 hours. The average rating of the intervention group using birthing ball exersice was 16.70 while the average rating of the control group was 28.30. This means that there is a significant difference in the length of the active phase of labour between the intervention group and the control group ($p=0.003$; $p<0.05$).

Table 4. Differences in the average duration of active phase I of the intervention group and control group

Group	n	Median	Std. Deviation	Minimum	Maximum	Mean Rank	Sum of Ranks	pvalue
Intervention	22	3,1400	0,89827	1,49	6,03	16,70	367,50	0,003
Control	22	4,0850	1,13696	2,32	6,44	28,30	622,50	

Based on Figure 1, it can be seen that the difference in the length of active phase I in labouring women who use birthing ball exersice (intervention group) is shorter by 3.14 than the control group by 4.085, meaning that birthing ball exersice is effective in reducing the length of active phase I in labouring women.

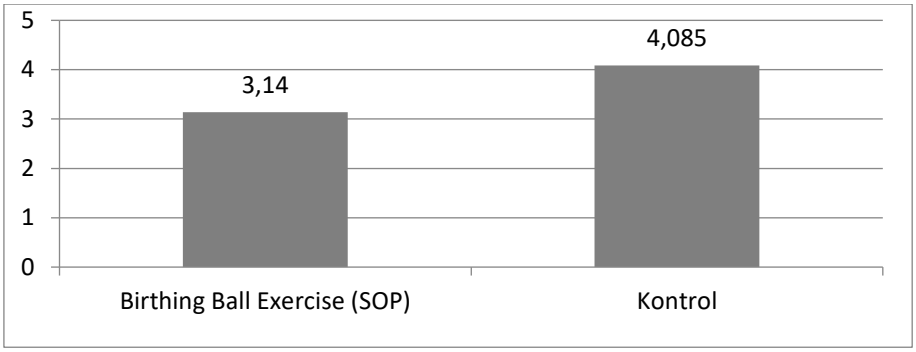

Fig 1. The difference between Birthing Ball Exersice (intervention) with the control group in labouring women

3.2. Discussion

This study aims to determine the effect of birthing ball exersice on the duration of active phase I in labouring women. In this study, the average duration of active phase I was shorter in the experimental group who performed birthing ball exersice compared to the comparison group who did not perform birthing ball exersice, meaning that birthing ball exersice was more effective in shortening the active phase I of labour compared to the control group. This is in line with Zaky's research (2016) which found that pelvic rocking exercises are effective in accelerating cervical dilatation and the descent of the bottom of the fetus [8]. The same study states that there is a significant relationship between the use of birth ball during the first stage of labour with a decrease in the duration of the active phase of labour [15] .

The progress or duration of labour is not the same as each other, as well as the age of first pregnancy and childbirth. As in our study, most of the respondents were 20-35 years old, but between the experimental group and the comparison group there was a difference in the duration of labour. The parts that greatly affect the duration of labour are: birth canal/passage, passenger: conception result (fetus and placenta), power: mother's strength (hiss and straining strength), psyche: mother's psychic (anxiety and readiness of mother in facing labour), position: mother's position during labour, helper and companion [2]. In this study, one of the factors analyzed was the birth canal and fetal position. In this context, the mother underwent treatment using a birthing ball to enhance the strength of the abdominal and lower back muscles. This helps alleviate abdominal and bladder pressure, promotes relaxation, and reduces tension, which in turn decreases the labor pain experienced by the mother. The rhythmic motion of pelvic rocking increases the pelvic outlet by 30%, facilitating perineal stretching with minimal pressure. Additionally, the upright sitting position promotes optimal oxygen flow and blood circulation to the fetus. Moreover, this movement utilizes gravity to help the fetus move down toward the pelvic floor, facilitating a faster and smoother descent during childbirth [16].

When respondents did the birthing ball exersice, they felt more comfortable when sitting and moving on the ball. Most respondents felt they could divert or control the pain of contractions when moving on the ball. In addition, respondents did not feel tired when doing this movement because respondents were only in a sitting position and made gentle movements on the ball so that it did not require a lot of movement that might cause fatigue or discomfort in labouring women. Assistance by birth attendants during the active phase is also one of the keys to the successful application of this birthing ball exercise, because birth attendants can monitor the accuracy of the movements made by respondents while on the ball and when hugging the ball

in a kneeling position. This helps the mother relax her ligaments and muscles, particularly in the pelvic area, allowing them to loosen and reduce pressure on the sacroiliac joint, blood vessels around the uterus, and the bladder, back, waist, and tailbone. Maintaining an upright posture supports the labor process and aids in positioning the fetus optimally, making vaginal delivery easier [17] . This activity also promotes the descent of the fetal head and enhances uterine contractions [15], [18].

This study concludes that using a birthing ball during labor, particularly in the active phase, significantly impacts the progress of labor. When the mother sits on the birthing ball, she naturally moves, rotating her pelvis and opening her thighs, which helps flex the muscles around the pelvis and supports optimal cervical dilation. The birth ball can be an important tool in the labour process and can be used in various positions including sitting upright on the ball while pushing, swinging or rotating as well as hugging the ball in a kneeling position so that the mother relaxes and helps the fetus descend. The birthing ball offers support to the perineum without applying excessive pressure, helping maintain the fetus's alignment in the pelvis. Sitting on the ball mimics the squatting position, which helps open the pelvis and accelerate the labor process [19].

4 Conclusion

This study shows that birthing ball exercise can shorten the duration of active phase I in labouring mothers. Birthing ball exercise is easy to perform, requires no special skills and has been shown to be effective in reducing the duration of labour. This method has been shown to be a simple and effective supplementary approach for alleviating discomfort during labor, assist fetal descent and cervical dilatation thus helping to speed up the labour process.

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