



The Effect of Combination of Pelvic Rocking Exercise and Back Massage to Pain and Duration of Labor in Primigravidae

Apri Sulistianingsih¹, Istikomah Istikomah¹, Ni Gusti Ayu Pramita Aswitami², Cipta Pramana^{3*} 

¹Department of Midwifery, University of Muhammadiyah Pringsewu, Lampung, Indonesia; ²Department of Midwifery, Institute of Health Science Bina Usada Bali, Badung, Bali, Indonesia; ³Department of Obstetrics and Gynecology, Medical Faculty, Tarumanagara University, Jakarta, Indonesia

Abstract

Edited by: Mirko Spiroski

Citation: Sulistianingsih A, Istikomah I, Aswitami NGAP, Pramana C. The Effect of Combination of Pelvic Rocking Exercise and Back Massage to Pain and Duration of Labor in Primigravidae. Open-Access Maced J Med Sci. 2022 Jan 03; 10(G):246-252.
https://doi.org/10.3889/oamjms.2022.7697

Keywords: Pelvic rocking; Back massage; Pain labor; Anxiety in labor

***Correspondence:** Cipta Pramana, Department of Obstetrics and Gynecology, Medical Faculty Tarumanagara University, Jakarta, Indonesia.
E-mail: pramanacipta@yahoo.com

Received: 25-Oct-2021

Revised: 14-Nov-2021

Accepted: 04-Dec-2021

Copyright: © 2022 Apri Sulistianingsih, Istikomah Istikomah, Ni Gusti Ayu Pramita Aswitami, Cipta Pramana

Funding: This research did not receive any financial support

Competing Interest: The authors have declared that no competing interest exists

Open Access: This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

BACKGROUND: The combination of pelvic rocking exercise using a birth ball and back massage as non-pharmacological therapy needs to be investigated in relation to reducing pain and labor duration in primigravida mothers.

AIM: This study aims to determine the effect of a combination of pelvic rocking exercise using a birth ball and back massage on pain and labor duration in primigravida mothers.

METHODS: The design of this study was quasi-experiment with the approach of non-equivalent control groups. The research sample was 160 primigravida maternity mothers. The sample in the treatment group was given pelvic rocking intervention using a birth ball and back massage and the sample in the control group was given standard labor care such as touch, and taught labor positions that were in an upright position, providing encouragement and counseling. This research conducted in July–December 2020.

RESULTS: The results showed that pelvic rocking using a birth ball and back massage was effective in reducing pain and labor duration in primigravida mothers.

CONCLUSION: The results of this study provide an understanding that there is a significant effect of the combination of pelvic rocking exercise and back massage on pain and duration of labor in primigravida mothers.

Introduction

According to data from the Indonesia Demographic Health Survey in 2017, the most common cases of childbirth complications in Indonesia are anxiety or severe pain, 53.5%, prolonged labor, 40.6%, and inability to push 10.3% [1]. Maternal childbirth primipara can increase stress and pain as it is the first experience for the mother [2]. The pain of labor is subjective to each individual [3]. Inappropriate care of labor pain can cause stress in labor and unwanted complications such as prolonged labor, risk of fetal distress, head compression, and low Apgar score [4]. Prolonged labor can also lead to increased cesarean delivery and labor induction [5].

Case prolonged labor can be caused by several factors which are uterine inertia, location of the fetus, fetal size, pelvis, premature rupture of membranes, age, and parity [6]. Factors related to the length of labor are a physical activity, the strength of the mother, fetus factor, position, psychology, education, and maternal parity. Maternal psychology is the highest factor on the length of time of delivery [7]. Maternal psychology relates to

stress and pain management during labor. Factors that influence labor pain include age, nulliparous mother, higher education, and cervical dilatation [8].

According to the World Health Organization (WHO), position of labor in women with normal labor without epidural analgesia is in accordance with the recommendation of individual choice in an upright position. The supine or supine position is not recommended because it will slow the duration of labor [9]. This is in line in a systematic review of the stated that women with the press position labor perpendicular have the duration of labor is lower than the supine position [10]. The delivery position has many aspects from both anatomy and physiology. Labor positions can affect contraction uterus effectivity, fetal well-being, comfort the mother, and the mother power.

Efforts to prevent prolonged labor are to make labor contractions more effective and the process of descending the fetal head faster so that the mother's labor is more effective. Midwives can perform pain management and increase the contraction by non-pharmacological therapy that is easy and non-invasive [9]. Several studies have shown non-pharmacological therapies that can be used to reduce

labor pain such as breathing exercises, massage, pelvic rocking, and the use of birth balls [11], [12], [13]. Complementary therapies can be combined, such as the pelvic rocking technique using a birth ball and back massage therapy to reduce pain, increase the duration of contractions so as to prevent prolonged labor.

Pelvic rocking can be done by sitting up straight on the birth ball and practicing pelvic rocking (pelvic rocking) during the first stage of labor, helping the abdomen to remain upright, and encouraging the baby to stay in an anterior position [14]. This pelvic rocking movement pushes the baby through the pelvis to form a circle, making movement like a figure eight and eases the baby's descent so that it quickly reaches the lowest Hodge [15].

Pelvic rocking technique with birth ball in several studies has been shown to be effective in reducing the duration of labor [16], [17]. The choice of pelvic rocking using a birth ball is because it has a significant impact on reducing labor pain. Birth balls can increase comfort and relaxation and reduce anxiety and pain during labor [18]. The higher the duration of labor contractions, the risk of labor pain will increase. By thus, the pain of labor continues to be present until the complete opening. During labor contractions, pregnant women will have difficulty moving so they need support to reduce pain, one of the efforts that can be made by birth attendants is to do back massage to the mother during contractions [14], [18]. However, there is still no research evidence that combines pelvic rocking in the birth ball with back massage in labor. This study aims to examine the effect of a combination of pelvic rocking exercise and back massage on pain and labor duration. A preliminary study conducted at the Independent Midwife Practice (PMB) in Pringsewu District showed that midwives were able to perform non-pharmacologic therapy, however, the practice of pelvic rocking using a birth ball and back massage had not yet become a delivery protocol.

subjects according to the research criteria. In this study, there were 160 maternity mothers who were willing to become respondents. Pregnant women were then randomly assigned to an intervention group (pelvic rocking with birth ball and back massage) and a control group (upright position). This study is to combine non-pharmacological and non-invasive procedures to determine the duration of labor and reduce pain in labor. The effect of the combination of pelvic rocking and back massage has not been studied in primigravida mothers in Lampung, especially in Pringsewu Regency. This study uses four PMB Pringsewu Lampung with a research time of July 2020–December 2020. The questionnaire consists of three parts, namely, data on the characteristics of the respondents in the form of age, gestational age, education, and occupation. For the pain instrument, the interview technique uses a visual analog scale (VAS) with an explanation of the pain range from 0 to 10. In the labor duration instrument, the midwife uses an observation technique to see the duration of contractions, the interval of contractions in 10 min, and the length of labor time.

Midwives will be present in the delivery room of both the intervention and control groups. For the intervention group, primigravida in labor will receive educational intervention to perform pelvic rocking with a birth ball [16]. Back massage education for birth attendants applied to maternity mothers. Birth attendants, especially husbands, can provide a positive experience for mothers in labor [19]. For the control group, the practice midwife will perform standard delivery care such as touch, and teach the appropriate delivery position in an upright position, and provide encouragement and counseling. The outcome assessor will measure and rate the intervention and control groups at the same time point. The assessment was carried out on pre-test data, 1 h after the first intervention, and 1 h after the second intervention. Both groups will be equipped with the same additional equipment in the form of a birth ball. This blinding attempt was intended to minimize bias during outcome assessment.

Materials and Methods

Design

This study uses a quasi-experiment design with a non-equivalent control group approach. The purpose of this study was to examine the effect of a combination of pelvic rocking exercise and back massage on pain and labor duration in primigravida mothers.

Sample

The subjects of this study were primiparous mothers who gave birth at the Midwife Independent Practice of Pringsewu Regency, Lampung. This study uses a quota sampling design to obtain research

Data collection

Maternity mothers who were willing and signed the consent were then assigned to the control and intervention groups. Filling out the questionnaire begins when the delivery mother enters the delivery room. Mothers in labor were then asked for a pain scale with a range of 0–10 adjusted for VAS. The midwife then completed observations of labor progress by documenting the interval of contractions, duration of contractions, and time of labor from Stage I to Stage III. Each questionnaire will be given an initial code. Data collection in the delivery room was carried out by midwives as enumerators who were also registered midwives. The completed questionnaire form is then checked again.

Intervention

The combination intervention of pelvic rocking and back massage consisted of 10–15 min of pelvic rocking then followed by back massage for 15 min and ended with 5 min of breathing exercises. In pelvic rocking therapy, the mother is taught to sit on the birth ball and then the mother is asked to shake the pelvis in a clockwise direction and vice versa for 5 min. At that stage, the mother taught to shake the pelvis to the right and left while making it like the number 8 for 5 min. Mothers are taught to rock the pelvis back and forth for 5 min. At the back massage stage, the birth attendant is taught the procedure for lower back and upper back massage. The companion was asked to perform an effleurage massage from the sacrum to the shoulder and deltoid three times. The companion massages and presses the thumb on the lateral side of the lumbar spine three times. Massage and press the thumb on the lateral side of the lumbar spine 3 times. Then clench your fists and thumbs on your lower back, side by side, 3 times. Then, move on to the upper back massage. The effleurage massage was followed by massaging the palms from the lumbar region to the lateral trapezius 3 times. Next, the thumb squeezes both sides of the erector spinae, then flows between the ribs to the armpit area 3 times. Next, squeeze the deltoid muscle by massaging it toward the armpit 3 times. Massage with your fingers on the trapezius muscles, followed by scooping fists 3 times. Finally, press the neck and shoulder areas on both sides 3 times. After completion, the mother was asked to do deep breathing relaxation to reduce pain and relax for 5 min [18].

In the control group, primigravida in labor will receive standard delivery in the delivery room with a picture of the delivery position included. Mothers are instructed to choose an upright position when they are in labor. The standing position, walking position, sitting position, squatting position, and crawling position are all suggested upright positions. When there are no contractions, mothers who are still able to bear the pain are instructed to stand and walk. When a contraction occurs, the mother is instructed to relax and breathe softly in through the nose. When the mother's agony becomes unbearable, she should sit or lie on her left side. This is repeated until the opening is finished.

Data analysis

The data will be entered by the enumerator using the blinding method. The research data were checked for accuracy before being analyzed. The analysis was performed using the IBM Statistical Package for the Social Sciences V.20. Descriptive univariate analysis will be carried out according to the type of data and data distribution. Normality test was used for continuous data using the Smirnov–Kolmogorov test. Categorical

variables will be reported in terms of frequency and percentage. The statistical test used the Chi-square test for categorical data. For numerical data, data analysis used the independent T-test if the data was normally distributed or used the Mann-Whitney U-test if the data was not normally distributed.

Ethical considerations

The study was approved by the Institutional Review Board of University Muhammadiyah Pringsewu (approval number: 351/KEPK/Fkes/2021). All participants provided informed consent. Furthermore, the survey was strictly anonymous to ensure confidentiality.

Results

Demographic characteristics

In the characteristics of age, education, occupation, gestational age, and cervical dilatation when they came to PMB, there was no significant difference between the intervention and control groups, as shown in Table 1. The research subjects in the control group were on average 27.29 (3.35) years old, while those in the intervention group were on average 26.38 (4.34) years old. The control group had a higher proportion of high school graduates (52.5%) than the intervention group, which had a slightly lower proportion of high school graduates (52.5%) (49.4%). The intervention and control groups had similar proportions of housewives as occupations (70% and 63.3%). Both the control

Table 1: Characteristics of research subjects based on age, education, occupation, gestational age, and cervical dilatation at first arrival

Variable	Control (n = 80)	Intervention (n = 79)	p value
Age (years old)			
Mean (SD)	27,29 (3,35)	26,38 (4,34)	0,768*
Median	28,0	27,0	
Range	20–37	18–36	
Education			
Elementary	6 (7,5%)	5 (6,3%)	0,615**
Junior high school	22 (27,5%)	19 (24,1%)	
Senior high school	42 (52,5%)	39 (49,4%)	
University	10 (12,5%)	16 (20,3%)	
Job			
Housewife	56 (70,0%)	50 (63,3%)	0,466**
Employee	24 (30,0%)	29 (36,7%)	
Gestational age			
37	1 (1,2%)	1 (1,3%)	0,929**
38	20 (25,0%)	23 (29,1%)	
39	34 (42,5%)	30 (38,0%)	
40	25 (31,2%)	25 (31,6%)	
Cervical dilatation on arrival			
2	6 (7,5%)	8 (10,1%)	0,473**
3	46 (57,5%)	36 (45,6%)	
4	23 (28,8%)	27 (34,2%)	
5	5 (6,2%)	8 (10,1%)	

Test description: * T independent test, ** Chi-square test.

and intervention groups had the highest proportion of cervical dilatation when they first arrived at the PMB at opening three (57.5% and 45.6%).

Table 2 shows the average number of contractions, duration of contractions, and labor pain. The average number of contractions using palpation in the intervention and control groups had no significant difference before the study, the range in the 1st h, and the range at the 2nd h (0.611, 0.365, and 0.810). The average number of contractions in the control group was higher than the intervention group before the study (2.48 ± 0.59 and 2.44 ± 0.59), in the 1st h, the control group was lower than the intervention group (3.59 ± 0.58 and 3.67 ± 0.59), the same thing at the 2nd h of the intervention group was slightly higher than the control group (4.51 ± 0.50 and 4.53 ± 0.50). The average duration of uterine contractions in seconds using palpation was almost the same in the control group and the intervention group before the study (20.09 ± 2.59 & 20.32 ± 2.03), there was no significant difference p value = 0.289 duration of contractions before the study. Contraction duration in the intervention group was longer than the control group in the first hour (29.98 ± 4.76 & 38.54 ± 4.76), and at the second hour (39.69 ± 5.32 & 51.48 ± 5.17). The results of statistical tests showed a significant difference in the duration of contractions in the first hour and the second hour between the two groups (p value = 0.000).

Table 2: Distribution of study subjects according to the average duration of uterine contractions in seconds, the average number of uterine contractions/10 min, and the pain scale using VAS.

Contractions and duration	Control (n = 80)	Intervention (n = 79)	p value
Contraction within 10'			
Pre			
Mean (SD)	2.48 (0.59)	2.44 (0.59)	0.611*
Median	2.0	2.0	
Range	1–3	1–4	
1st h			
Mean (SD)	3.59 (0.58)	3.67 (0.59)	0.365*
Median	4.0	4.0	
Range	3–5	3–5	
2nd h			
Mean (SD)	4.51 (0.50)	4.53 (0.50)	0.810*
Median	5.0	5.0	
Range	4–5	4–5	
Contraction duration			
Pre			
Mean (SD)	20.09 (2.59)	20.35 (2.03)	0.289*
Median	19.0	20.0	
Range	10–28	17–28	
1st h			
Mean (SD)	29.98 (4.76)	38.54 (4.76)	0.000*
Median	29.0	39.0	
Range	20–39	29–51	
2nd h			
Mean (SD)	39.69 (5.32)	51.48 (5.17)	0.000*
Median	39.0	51.0	
Range	28–52	34–60	
Pain scale			
Pre			
Mean (SD)	3.30 (0.56)	3.63 (0.80)	0.002*
Median	3.0	4.0	
Range	2–5	2–5	
1st h			
Mean (SD)	5.80 (0.68)	4.70 (0.79)	0.000*
Median	6.0	5.0	
Range	5–7	3–6	
2nd h			
Mean (SD)	7.08 (0.96)	5.92 (0.85)	0.000*
Median	7.0	6.0	
Range	5–9	4–8	

Test description: * Mann–Whitney U-test.

The table also describes the labor pain scale which shows that at the beginning of the study, the control group was lower than the intervention group

(3.30 ± 0.56 and 3.63 ± 0.80) statistical results showed a significant difference (p = 0.002). In the 1st h showed that the control group labor pain was higher than the intervention group (5.80 ± 0.68 and 4.70 ± 0.79), the statistical test results showed a significant difference (p = 0.000). In the 2nd h showed that the control group labor pain was higher than the intervention group (7.08 ± 0.96 and 5.92 ± 0.85), statistical tests showed a significant difference (p = 0.000)

Table 3 told the average duration of the first stage, second stage, and third stage of labor. The duration of the first stage in the control group was longer than the intervention group (276.19 ± 64.00 and 222.72 ± 57.06); there was a significant difference in the duration of the first stage of labor in the two groups (p = 0.000). The duration of the second stage of labor in the control group was longer than the intervention group (78.06 ± 17.22 and 54.14 ± 22.06); there was a significant difference in the duration of the second stage of labor in the two groups (p = 0.000). The duration of the second stage of labor in the control group was longer than the intervention group (78.06 ± 17.22 and 54.14 ± 22.06); there was a significant difference in the duration of the second stage of labor in the two groups (p = 0.000).

Table 3: The average length of labor in the first, second, and third stages of labor

Delivery outcome	Control (n = 80)	Intervention (n = 79)	p value
Stage I in the midwife (min)			
Mean (SD)	276.19 (64.00)	222.72 (57.06)	0.000*
Median	279.50	210.0	
Range	190–419	107–361	
Stage II (min)			
Mean (SD)	78.06 (17.22)	54.14 (22.06)	0.000*
Median	78.0	52.0	
Range	46–110	20–90	
Stage III (min)			
Mean (SD)	13.19 (3.15)	10.95 (1.88)	0.000*
Median	13.0	11.0	
Range	8–21	8–15	

Test description: *) Mann–Whitney U-test.

Discussion

The characteristics of the research subjects in this study were almost the same in both groups (p > 0.05). This characteristic equation makes the results of the study to be minimally biased that can interfere during the study. Mother primigravidae in Pringsewu District found that the two groups are in the age range of 18–37 years. The average age of respondents in the control and intervention groups was in their reproductive age (27.29 ± 3.35 and 26.38 ± 4.34). This is a healthy reproductive range, which is in the range of 20–25 years where at this age, the reproductive organs are mature and low in risk of birth complications. This is in accordance with Obuna's research (2014) which states that there is a significant effect on younger and primiparous mothers on pain.

Characteristics of education show the most high school education in both groups. Education shows

a person's ability to think in seeking information and knowledge in this case is information about childbirth. Education is an important factor for a person in making decisions for his health. According to research by Shrestha (2013), one's education is not related to labor pain. On the subject of university and senior high school, it shows that labor pain is almost the same as compared to elementary education. This is different from previous research which states that the higher education will increase awareness for pain and ask for help to reduce labor pain. According to researchers, education also affects the acceptance of health education to reduce pain and increase the effectiveness of labor contractions [3].

In this study, most of them were housewives in both the intervention group and the control group. The characteristics of Pringsewu Regency, which are mostly rural, make more mothers not working compared to working mothers. This should reduce the workload of mothers during pregnancy and have a better impact on childbirth compared to working mothers, however, it will have an impact on family income. As in the previous studies that income will affect stress and anxiety which can increase pain during childbirth, this also applies vice versa [2]. Cervical dilatation at the time of delivery will affect the pain of labor. Most maternity mothers came to PMB with three openings. This dilation is a transition phase from the latent phase to the active phase. In general, mothers are still able to withstand labor pains seen from labor pain when it comes with a pain scale of two. Labor pain was seen to be more severe in late labor with more than half describing it as severe when the cervix was dilated to 5 cm, compared with 3 and 4 cm [8].

In this study, labor pain increased compared to before the intervention, 1 h of intervention, and 2 h of intervention in both groups. However, labor pain in the group that received pelvic rocking with a birth ball and back massage was lower than the control group who was given counseling to reduce pain ($p < 0.005$). At the beginning of labor, the intervention group had higher pain but in the 1st and 2nd h; it showed that the intervention group had lower labor pain. Back massage provides a sense of comfort to the mother, especially during contractions, regular touch, and pressure on the mother's back and hips loosen the pelvic muscles so that the mother feels more comfortable.

The combination of pelvic rocking exercise and back massage in this study had a significant effect on pain and labor duration in primigravida mothers ($p < 0.05$). This study shows that the effect of the pelvic rocking method of delivery on the birth ball can increase labor contractions to be more effective. This shows that the upright position of labor and pelvic movement (intervention group) is more effective than upright position alone (control group) to help lower the fetal head and increase the effectiveness of contractions. The choice of using a birth ball is due to the shape of the birth ball which is comfortable for the mother to use in pelvic rocking in various positions. In this study, most of

the positions used were sitting. When the mother uses the birth ball, the mother can move the pelvis by turning, right and left, as well as forward and backward, when the mother is tired, the mother can hug the birth ball to lean on. This movement can help the fetus in rotation and decrease the fetus so that the delivery process is faster. At this stage, the mother will be more comfortable and relaxed while the fetus is in the process of lowering its head. The impact of this birth ball is to lower the fetal head faster and make the duration of labor shorter.

This study is in line with Zaky (2016) who stated that the group of women who received pelvic rocking experienced a shorter duration of labor compared to the group that did not receive pelvic rocking [15]. Pelvic rocking using a birth ball reduces the intensity of ligament pain and the duration of labor. Rocking the pelvis in a sitting position using a birth ball forward and backward allows the woman's pelvis to move and encourage the fetus to descend according to gravity [20]. In an upright position, the blood circulation is smooth which promotes intensive uterine contractions. This indicates a more rapid progress of cervical dilatation and effacement. Effective contractions are very important to help dilate the cervix [16]. The upright position on pelvic rocking shows good effectiveness compared to the supine position [21]. The use of birth balls increases comfort and relaxation and reduces anxiety [22]. Birth ball is a tool that can facilitate the movement of the mother to help decrease the fetus. The benefits of maternal movement using a birth ball help correct the position of the fetus so that the fetus can position its head well and shorten the duration of labor [23].

In this study, therapy back massage was got of research subjects tested can lower pain scores in the intervention group compared with the control group ($p < 0.05$). The birth attendant was present to play an active role in the delivery process compared to the control group. The presence of a person who supports the birth has a beneficial effect by providing back massage, especially during labor contractions. Massage is easier to do when the mother sits on the birth ball so that the mother's body can adjust to the movements of the back and pelvic massage by the birth attendant. This can help physically and emotionally for the mother so that the mother is more comfortable and has an impact on lower labor pain tolerance. Massage therapy is a mechanical stimulus produces a short-term analgesic that can control the pain. The suppression of this pain mechanism is through descending afferent pathways [24]. Massage then inhibits pain transmission neurons involving a combination of physiological and neurologic mechanisms that prevent the release of the hormone cortisol, an adrenocorticotropic hormone. Massage therapy increases endorphin and oxytocin hormones so that it can reduce stress and pain [25].

In a systematic review, back massage can be used as a non-pharmacological therapy to reduce pain in labor, shoulder, neck, lower back, and

cancer including post-surgery, however, the benefits of bank are only short term but not useful in short-term therapy [25]. This is in accordance with the physiology of labor that lasts a short time so that back massage therapy can be an alternative in reducing labor pain. In contrast to the control group, which only used breathing control during pain and upright movements, which increased a lot of standing and sitting, increased energy requirements, the mother was easily tired and more sensitive to pain. As a result, mothers often choose to lie on their left side. The lying position, resulting in delayed labor and labor pain is much higher than the upright position [7]. This is in line with previous research by Hau (2012), namely, the use of birth balls can increase the mother's comfort, help the baby find the most suitable position for the pelvis, facilitate pelvic rotation, and decrease the fetal head so as to make the mother exert less effort and the duration of labor is shorter. In the opinion of the researcher, both groups of this study benefit. In the control group, the application of an upright position is highly recommended so that the duration of labor does not experience prolonged labor, however, labor pain is higher. In the intervention group, the duration of labor was shorter and the pain was lower. This suggests that pelvic rocking interventions using a birth ball and back massage can promote a more comfortable birth and reduce morbidity for both mother and baby.

Conclusion

This study is a preliminary study on an unequal control group and a small sample. However, the results of this study provide an understanding that there is a significant effect of the combination of pelvic rocking exercise and back massage can reduce pain and duration of labor in primigravida mothers. The findings show that pelvic rocking and back massage are effective pain management and labor duration treatments that are both safe and non-invasive. By involving the family during the early stage of labor, pelvic rocking movements with a birth ball and back massage should be combined with programs for expectant women. Both the mother and the baby may benefit from this. Because the mother is not in agony and the family is better taught throughout childbirth, antenatal intervention may make education more acceptable, and it may be a recommendation for further research.

Acknowledgment

Health workers can implement a combination of pelvic rocking and back massage for pain and

duration of labor in primigravidae mothers. Thanks to everyone involved in the research.

References

1. Ministry of Health of the Republic of Indonesia. Indonesian Health Demographic Survey 2017. Jakarta: Badan Pusat Statistik; 2017.
2. Nisa SM, Murti B, Qadrijati I. Psychosocial factors associated with anxiety and delivery pain. *J Matern Child Health*. 2018;3(1):44-58.
3. Obuna J, Umeora OU. Perception of labor pain and utilization of obstetric analgesia by Igbo women of Southeast Nigeria. *J Obstet Anaesth Crit Care*. 2014;4(1):18.
4. Nystedt A, Hildingsson I. Diverse definitions of prolonged labour Inappropriate, and its consequences with sometimes subsequent. *BMC Pregnancy Childbirth*. 2014;14:233. <https://doi.org/10.1186/1471-2393-14-233>
PMid:25031035
5. Lowe N. A review of factors associated with dystocia and cesarean section in nulliparous women. *J Midwifery Womens Health*. 2007;52(3):216-28. <https://doi.org/10.1016/j.jmwh.2007.03.003>
PMid:17467588
6. Yohanna WS. Analysis of factors related to the old labor. *J Aisyah*. 2016;(1):1-14.
7. Soviyati E. Factors related duration of labor in RSUD'45 Kuningan West Java 2015. *J Bidan Midwife J*. 2016;2(1):33-43.
8. Shrestha I, Pradhan N, Sharma J. Factors influencing perception of labor pain among parturient women at Tribhuvan university teaching hospital. *Nepal J Obstet Gynaecol*. 2013;8(1):26-30.
9. World Health Organization. Intrapartum Care for a Positive Childbirth Experience. Geneva: World Health Organization; 2018. p. 212.
10. Gupta J, Sood A, Hofmeyr G, Vogel J. Position in the second stage of labour for women without epidural anaesthesia. *Cochrane Database Syst Rev*. 2017;5(5):CD002006. <https://doi.org/10.1002/14651858.CD002006.pub4>
PMid:28539008
11. Nattah FM, Abbas WA. Assessment of level of pain and its relation with breathing exercise in the first stage of labour among primi mothers at hilla teaching hospital. *Eur J Sci Res*. 2015;135(2):121-8.
12. Smith C, Levett K, Collins C, Dahlen H, Ee C, Sukanuma M. Massage, reflexology and other manual methods for pain management in labour. *Cochrane Database Syst Rev*. 2018;3:CD009290. <https://doi.org/10.1002/14651858.CD009290.pub3>
PMid:29589380
13. Shirazi MG, Kohan S, Firoozehchian F, Ebrahimi E. Experience of childbirth with Birth ball: A randomized controlled trial. *Aras Part Med Int Press*. 2019;7(3):301-5.
14. Abdolalian S, Ghavi F, Abdollahifard S, Sheikhan F. Effect of dance labor on the management of active phase labor pain and clients' satisfaction: A randomized controlled trial study. *Glob J Health Sci*. 2014;6(3):219-26. <https://doi.org/10.5539/gjhs.v6n3p219>
PMid:24762366
15. Zaky NH. Effect of pelvic rocking exercise using sitting position on birth ball during the first stage of labor on its progress. *IOSR J Nurs Heal Sci*. 2016;5(4):19-27.

16. Yeung MP, Tsang KW, Yip BH, Tam WH, Ip WY, Hau FW, *et al.* Birth ball for pregnant women in labour research protocol: A multi-centre randomised controlled trial. *BMC Pregnancy Childbirth*. 2019;19(1):153. <https://doi.org/10.1186/s12884-019-2305-8>
PMid:31060522
17. Hau WL, Tsang SL, Kwan W, Siu-King Man L, Lam KY, Ho LF. The use of birth ball as a method of pain management in labour. *Hkjgom*. 2012;12(1):1-6.
18. Baljon KJ, Baljon KJ, Romli MH, Ismail AH, Khuan L, Chew BH. Effectiveness of breathing exercises, foot reflexology and back massage (BRM) on labour pain, anxiety, duration, satisfaction, stress hormones and newborn outcomes among primigravidae during the first stage of labour in Saudi Arabia: A study protocol for. *BMJ Open*. 2020;10(6):e033844. <https://doi.org/10.1136/bmjopen-2019-033844>
PMid:32540887
19. Ilkay G, Beji NK. Effects of fathers' attendance to labor and delivery on the experience of childbirth in Turkey. *West J Nurs Res*. 2007;29(2):213-31. <https://doi.org/10.1177/0193945906292538>
20. Taavoni S, Abdolahian S, Haghani H, Neysani L. Effect of birth ball usage on pain in the active phase of labor: A randomized controlled trial. *J Midwifery Womens Health*. 2011;56(2):137-40. <https://doi.org/10.1111/j.1542-2011.2010.00013.x>
PMid:21429078
21. Gizzo S, Di Gangi S, Noventa M, Bacile V, Zambon A, Nardelli GB. Women's choice of positions during labour: Return to the past or a modern way to give birth? A cohort study in Italy. *Biomed Res Int*. 2014;2014:638093.
PMid:24955365
22. Leung RW, Li JF, Leung MK, Fung BK, Fung LC, Tai SM, *et al.* Efficacy of birth ball exercises on labour pain management. *Hong Kong Med J*. 2013;19(5):393-9. <https://doi.org/10.12809/hkmj133921>
PMid:23878201
23. Ni MY, Yang L, Leung CM, Li N, Yao XI, Wang Y, *et al.* Mental health, risk factors, and social media use during the COVID-19 epidemic and cordon sanitaire among the community and health professionals in Wuhan, China: Cross-sectional survey. *JMIR Ment Health*. 2020;7(5):e19009. <https://doi.org/10.2196/19009>
PMid:32365044
24. Goats GC. Massage the scientific basis of an ancient art: Part 1. The techniques. *Br J Sports Med*. 1994;28(3):149-52. <https://doi.org/10.1136/bjism.28.3.149>
PMid:8000809
25. Miake-Lye IM, Mak S, Lee J, Luger T, Taylor SL, Shanman R, *et al.* Massage for pain: An evidence map. *J Altern Complement Med*. 2019;25(5):475-502. <https://doi.org/10.1089/acm.2018.0282>
PMid:30892910