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RESEARCH ARTICLE

Difference Duration of Labor at BC-MK15 Birth Chair with Conventional Bed in Multiparous

Fitriani,[1,2] Johanes Cornelius Mose,[3] Herry Herman[4]

[1]Dinas Kesehatan Kabupaten Bireuen, Birieun, Indonesia, [2]Midwifery Master Study Program, [3]Department of Obstetrics and Gynecology, [4]Department of Orthopaedics and Traumatology, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia

Abstract

Prolonged labor increases the mortality and morbidity of mother and baby. The philosophy of childbirth is a natural process by taking the upright positions. The BC-MK15 birth chairs can facilitate the vertical position of the delivery mother. This study aims to analyze the difference of childbirth duration in the BC-MK15 birth chair with the conventional bed in multiparous. This research was an experimental study of posttest-only control group design. Experimented at *Pelayanan Obstetri Neonatal Emergensi Dasar*/PONED (Basic Emergency Obstetric and Neonatal Care/BEONC) Puskesmas (Public Health Center) Garuda, Puter, and Ibrahim Aji Bandung from 17 April–26 May 2017. The research samples were 30 multiparous on their first stage active phase of treatment and control group. Sampling method using a random permuted block. Birth measurements using the digital Q & Q stopwatch. The results of the duration during the active phase of first stage BC-MK15 was shorter 250.44 minutes than conventional bed 271.61 minutes (p=0.038). The second stage of the BC-MK15 birth chair was shorter 20.67±2(1.02) minutes than the conventional beds of 26.06±2(1.08) minute (p=0.001). The total duration of the labor of BC-MK15 was 269.42 minutes shorter than conventional bed 299.09 minutes (p=0.011). In conclusion, the duration of childbirth is shorter in the BC-MK15 birth chair than the conventional bed in multiparous.

Keywords: BC-MK15 birth chairs, conventional bed, duration of labor

Perbedaan Lama Persalinan di Kursi Persalinan BC-MK15 dengan Tempat Tidur Konvensional pada Multipara

Abstrak

Persalinan lama meningkatkan mortalitas dan morbiditas ibu dan bayi. Upaya yang dapat dilakukan sesuai filosofi persalinan adalah proses alamiah dengan memanfatkan posisi tegak. Kursi persalinan BC-MK15 dapat memfasilitasi posisi tegak pada ibu bersalin. Penelitian ini bertujuan menganalisis perbedaan lama persalinan di kursi persalinan BC-MK15 dengan tempat tidur konvensional pada multipara. Penelitian ini merupakan studi eksperimental *posttest-only control group design*. Sampel penelitian multipara kala I fase aktif di Puskesmas Pelayanan Obstetri Neonatal Emergensi Dasar (PONED) Garuda, Puter, dan Ibrahim Aji Kota Bandung. Penelitian dilakukan pada 17 April–26 Mei 2017 yang memenuhi kriteria inklusi berjumlah 30 sampel tiap-tiap kelompok perlakuan dan kontrol. Pengambilan sampel menggunakan *random permuted block*. Pengukuran lama persalinan menggunakan *stopwatch* digital merek Q&Q. Hasil penelitian lama persalinan kala I fase aktif kursi persalinan BC-MK15 lebih singkat 250,44 menit daripada tempat tidur konvensional 271,61 menit (p=0,038). Kala II kursi persalinan BC-MK15 lebih singkat 20,67±2(1,02) menit daripada tempat tidur konvensional 26,06±2(1,08) menit (p=0,001). Total lama persalinan kursi persalinan BC-MK15 lebih singkat 269,42 menit daripada tempat tidur konvensional 299,09 menit (p=0,011). Simpulan, lama persalinan lebih singkat pada kursi persalinan BC-MK15 daripada tempat tidur konvensional pada multipara.

Kata kunci: Kursi persalinan BC-MK15, lama persalinan, tempat tidur konvensional

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Correspondence: Fitriani, S.Si.T., M.Keb. Dinas Kesehatan Kabupaten Bireuen. Jln. Banda Aceh–Medan km 216, Desa Blang Cot Tunong, Kecamatan Jeumpa, Bireuen 24251, Aceh, Indonesia. Mobile: 6281361709503. E-mail: fitri2978@gmail.com

Introduction

Childbirth is a physiological process, the World Health Organization (WHO) estimates that 70–80% of pregnant women have low risk from delivery to birth.[1] The progress of childbirth is effected by 5 P namely passage, passanger (fetal or infant), power (strength of uterine contractions), psyche (psychological condition), and position (position).[2] Prolonged labour or dystocia may increase mortality and morbidity of mother and baby with prevalence 33% occurs in primiparas and 7% in multiparas.[3] In Indonesia, 90% of maternal deaths occur at the time of labor and soon after labor, one of the causes of maternal deat is prolonged labor as much as 5%.[4]

Efforts that can be done as a form of the application of maternal love care and in accordance with the concept or philosophy that pregnancy and childbirth is a natural process, is by using the upright position that supports the childbirth so that it runs physiologically.[5] The advantage of upright position is the utilization of the effects of gravity, causing stimulation at the pituitary gland that can increase the release of oxytocin so that uterine contractions become more intensive, and affect the cervical dilation, upright position can also reduce the compression of the aortocaval, fetal conformity and the birth canal, and to increase pelvic outlet diameters. Stretch occurring in the posterior vagina causes endogenous oxytocin release resulting in a Ferguson reflex that triggers the mother's mother's desire to bearing down.[6,7]

The results of meta-analysis on 25 studies of 5,218 mother was in active phase of first stage labor in the upright position were shorter 1 hour 22 minutes than the recumbent position.[6,8–11] The results of the meta-analysis on 12 studies of 1,486 first stage labor on multiparous approximately 30 minutes in the upright position,[9] where as Jahanfar et al.[12] study on 50 samples of second stage labor on multiparous at upright position 10.78 (9.85) minutes and at recumbent position 16.52 (14.98) minutes.

Supine position is commonly used in contemporary obstetric care. The main advantage of this position is the convenience of the health worker in performing an abdominal examination to monitor the fetal heart rate.[13] The disadvantages that must be observed in the supine position, namely the high pain due to the duration of prolonged labor, the effort of the mother straining 30% heavier than the upright position, diminished maternal blood flow in infants because aortic pressure, inferior vena cava, and umbilical cord compression, supine position also did not occur pelvic mother mobilization.[1,8,14]

The development of science and technology facilitates the upright position during delivery through the delivery of birth chairs designed to facilitate the delivery process in order to walk physiologically.[15] Currently innovation of the latest generation of birth chairs is one of AVE birthing bed that has been exported to 80 countries.[16] Previous research about the EZ birth seat birth chair duration of second stage labor is shorter with pvalue <0.01.[7] The research of Swedish birth seat duration of 1st labor and 2nd stage labor is also shorter with p=0.01.[17] Birthing Chairs-Magister Kebidanan 2015 (BC-MK15) was designed in accordance with the concept of EZ birth chair, Swedish birth seat and AVE birthing bed has been awarded by the Red Dot Design Award in 2003 and 2017 for AVE 2 which facilitates the physiological process of birth by using upright positions.[16,18] This study aims to analyze the difference duration in labor between births in BC-MK15 and conventional beds in multiparous.

Methods

This research was an experimental research with posttest-only control group design done at *Pelayanan Obstetri Neonatal Emergensi Dasar*/ PONED (Basic Emergency Obstetric and Neonatal Care/BEONC) Puskesmas (Public Health Center) Garuda, Puter, and Ibrahim Adjie Bandung from April 17 until May 26, 2017. How to select sample with consecutive sampling according to inclusion criteria, multiparous age 20–35 years, gestational age ≥37 to <42 weeks, cervical 4 cm dilated, single live fetus with fetal occiput is in occiput anterior position (OA), intact amniotic fluid, uterine contraction effective; regular rhythm, frequency 3 times/10 minutes, no acceleration of labor with drugs, estimated fetal weight 2,500 to 4,000 g, had a history of normal labor, BMI 18.5 to 24.9, and willing to be respondents. Exclusion criteria, cephalo pelvic disproportion, HB <11 g/ dL, gestational distance <2 years and ≥10 years, pregnancy history with complications such as preeclampsia, eclampsia, antepartum bleeding (any contagious labor vaginal delivery), and no maternity assistant.

The study sample allocation used random

permuted blocks to determine the admission sample in the treatment group (BC-MK15 birth chair) or control (conventional bed). Criteria for drop out, which is a maternal who can not continue vaginal delivery (labor with acts such as extraction vacuum and cesarean delivery), partus precipitus labor that lasts less than 3 hours since the onset of regular contractions, prolonged labor, cannot with holding labor pain, and being in a BC-MK15 birth chair or a conventional bed less than 80% during labor. Birth measurement using digital stopwatch Q & Q brand.

The independent variable was the BC-MK15 birth chair and the conventional bed, the dependent variable was the duration of labor. Characteristics of respondents based on maternal education, economic status, parity, station, rupture of amniotic membrane, cervical dilation when rupture of amniotic membrane and the weight of newborns. Test the normality of data using Shapiro-Wilk ($p>0.05$). Characteristics of the respondents were analyzed by chi square test ($p<0.05$), active phase of 1st stage of labor duration and total duration of labor were analyzed by Mann-Whitney test ($p<0.05$), the 2nd stage duration was analyzed by unpaired t test ($p<0.05$).

The protocol has been approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran, Bandung number: 294/UN6.C.10/PN/2017.

Results

Table 1 presents characteristic of respondents. The result of statistical test of respondent characteristic was found, there was no significant difference between the two groups ($p>0.05$).

The duration of the active phase of first stage labor in the BC-MK15 birth chair group was

Table 1 Statistical Analysis of Respondent's Characteristic

Characteristic	Groups		p Value*
	BC-MK15	Conventional Bed	
	n=30	n=30	
Last education			
Low	18	15	0.529
Medium	10	14	
High	2	1	
Income every month (IDR)			
≤2,626,940.00	22	20	0.573
>2,626,940.00	8	10	
Parity			
2	18	18	0.881
3	9	10	
4	3	2	
Station			
0	9	6	0.618
+1	16	17	
+2	5	7	
Rupture of amniotic membrane			
Spontaneous rupture	28	27	1.000
Amniotomy	2	3	
Cervical dilation when rupture of amniotic membrane			
Cervical 7–8 cm dilatated	28	26	0.671
Cervical 9–10 cm dilatated	2	4	
Newborn body weight (g)			
2,500–2,999	13	8	0.371
3,000–3,499	14	17	
3,500–4,000	3	5	

IDR: Indonesian rupiah, *chi-square

Table 2 Statistical Analysis Comparison Duration of Labor

Duration of Labor	Groups		p Value
	BC-MK15	Conventional Bed	
Active phase of 1st stage			
Mean (SD)	250.75 (24.92)	265.38 (31.89)	0.038**
Median	250.44	271.61	
Range	204.17–303.35	216.57–312.28	
2nd stage			
Mean±2(SE)	20.67±2(1.02)	26.06±2(1.08)	0.001*
Median	19.32	27.55	
Range	10.05–32.47	10.05–34.12	
Total labor duration (active phase of 1st stage–2nd stage)			
Mean±SD	271.42 (26.50)	291.44 (32.99)	0.011**
Median	269.42	299.09	
Range	226.07–334.62	231.62–336.40	

**Mann-Whitney test, *t test

250.44 minutes shorter than the conventional bed group of 271.61 minutes with p<0.05. The result indicates that there was a significant difference in the duration of the active phase of first stage labor in the group of BC-MK15 birth chair was shorter than in the conventional bed group (Table 2).

The mean duration of second stage labor in the group of BC-MK15 birth chairs was shorter 20.67+2(1.02) minutes than in the conventional bed group of 26.06+2(1.08) minutes with p<0.05. There was a significant difference in that duration of labor order II in BC-MK15 birth chairs group was shorter than the conventional bed group.

Total labor duration in the group of BC-MK15 birth chairs had the median value of 269.42 minutes shorter than the conventional bed group of 299.09 minutes with p<0.05 indicates that there was a significant difference between total labor duration with the group of BC-MK15 birth chairs shorter than in the conventional bed group.

Presentation of data with box plot in Figure 1, shows median line (Q2) in the control group not in the center of the box, whisker not symmetric in the control group. The data has a broader range (IQR/Q3-Q1) the higher control group showed that the data is spreading. In the treatment group, there were outlier data (symbol o) illustrates the distribution of the data is not normal.

Figure 2 showed 95% of respondents in the BC-MK15 birth chairs were between the mean of 20.67+2 (1.02) and in the conventional bed group, 95% were between the mean of 26.06+2(1.08).

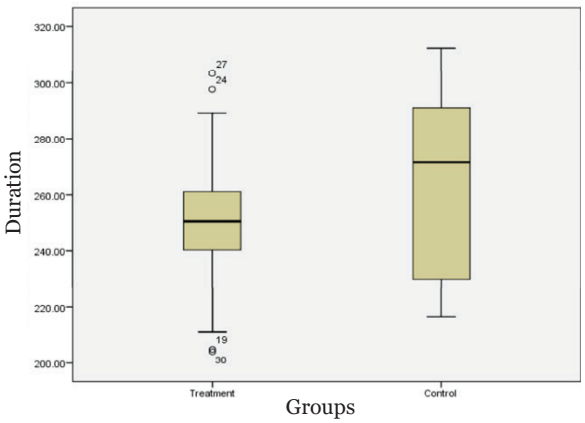

Figure 1 Duration of Active Phase of First Stage Labor

Figure 2 Mean Duration of Second Stage Labor

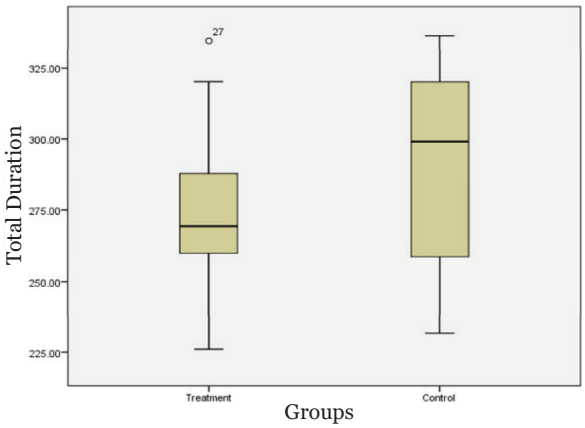

Figure 3 Total Labor Duration

Short bars indicate high precision and differences between the two groups are meaningful.

Figure 3 shows median line (Q2) in the control group not in the center of the box, whisker not symmetric in the control group. The data had a broader range (IQR/Q3-Q1) in the higher control group. In the treatment group, there were outlier data (symbol o) which illustrates the distribution of the data is not normal.

Discussion

Respondents are multiparous during the active phase of first stage labor in work area 3 PONED Puskesmas Bandung. Characteristics observed were economic status, parity, station, rupture of amniotic membrane, cervical dilation when rupture of amniotic membrane and the weight of newborns. The characteristics of the two homogeneous groups are therefore comparable.

A study of differences in labor duration between the BC-MK15 birth chairs and conventional beds was significantly different, labor duration in the BC-MK15 birth chair is shorter than conventional bed group. This is supported by the results of the analysis which can be seen at stage of active phase of 1st stage and 2nd stage labor, the statistical analysis also shows significant differences, the duration of active phase of 1st stage and 2nd stage labor is shorter in the group of BC-MK15 birth chair than the conventional bed groups. This study is in line with previous research, the meta-analysis result of 12 studies to 1,486 first stage labor on multiparous about 30 minutes shorter in an upright position.[9] At the second stage labor of Jahanfar et al.'s study in 2004 on 50 samples of second stage labor in multiparous at upright position 10,78 (9.85) minutes and at the recumbent position of 16.52 (14.98) minutes.[12]

The BC-MK15 birth chair can facilitate upright positioning during childbirth. Anatomically the upright position forms a hip angle between 60° to 90° compared to the hip angle at 30° recumbent position. Dimensions of the pelvic inlet and pelvic outlet also increased. The upright position results in the amount of pressure on the ischial tuberosities resulting in a passive stretching of the magnus of the muscle adapter. Muscle stimulation causes the shaft of the sacroilliaca joint to move backward to the lower sacrum, resulting in dilation of the intertuberose diameter.[19] The upright position widens the sagittal diameter under the pelvis 2±5 mm, the interspine diameter is 7±8 mm, the intertuberous diameter is 3±7 mm to facilitate chilbirth.[20]

The BC-MK15 birth chair can also facilitate position changes with a reclining design that can support the back strongly.[8,15] The fowler position is an upright position with the head of the bed at an angle 80° to 90°, while the semi-Fowler's position of the head of the bed at an angle 45° to 60°. This position is a safe choice for maternal activity during the first order of childbirth.[21]

The upright position will reduce pressure on the blood vessels, and the blood flow becomes smooth which make contraction of the uterus better.[6] The contraction of the uterus has a vital role in obstetric mechanics and modify intrauterine pressure, which in turn provides a force that allows fetal movement. The force given by the fetus in the soft tissues changes shape depending on uterine contractions.[22]

The pelvic soft tissues also play a role in childbirth, the lower segment of the uterus will expand to accommodate intrauterine contents as well as with the thickened upper segment walls. The cervix will be pulled up and past the presenting part as this section moves down. The vaginal canal will be distended to accommodate the fetal passage.[2] Gravity of the pressure forces on the cervix will stimulate the proprioceptive nerves that will increase the Ferguson reflex and cause the pituitary gland to release oxytocin, thus increasing the contraction effectiveness. Active contractions and the magnitude of fetal head pressure will increase pressure on the cervix; the cervix will be pulled upwards so that thinning and opening this will have an impact on the shortening of first stage labor.[6,7]

Upright position also cause the fundus leading to the front, causing the alignment of the axis

extend the birth canal and directing the fetal head toward the pelvic outlet. The pelvic tilt adjusts the fetus forward to the birth canal from the abdomen to the pelvis so that during the labor process it facilitates the fetus to perform a series of movements to pass through the flanks (seven cardinal movements of labor).[6,19]

Second stage labor takes place at the time of complete opening until the baby is born, the physiological benefits of maternity and childbirth in an upright position, namely the presence of intra-abdominal pressure due to contraction of the abdominal muscles and diaphragm pressure. Increased intrauterine pressure due to uterine contractions that cause pressure on the fetal decline and when the fetal presentation section reaches the perineal base, mechanical stretching of the cervix occurs. Stretching in the posterior vagina causes endogenous oxytocin release and a Ferguson reflex that triggers the mother's desire to bearing down.[6]

The role of gravity in the sitting position when straining can increase the pelvic pressure of 30–50 mmHg higher than the supine position so that the upright position at childbirth may increase the effectiveness of straining.[8] Other theories state that strength at the pelvic floor of 54 Newton when the contraction and the force of gravity that working when voluntary pushing 120 Newtons. As for the contribution of gravity to forces acting on fall of the fetus through the birth canal is the force acting on the fetal derivatives most effectively when it is close to the direction of gravity, so gravitational use is instrumental in the labor process.[22]

The slope of the chair facilitates features of the BC-MK15 birth chair following the principle of upright position (avoiding the supine position) 45° from the horizontal. Legs rest and handgrip can be used in the second stage labor so that will help balance the posture of the body during childbirth which will ultimately increase the effectiveness of bearing down.[8] Legsrest with the buffer connection on the knee folds provides support to the patient during labor and widens the birth canal in labor.[15] Handgrip on each side act as a support for the hand, maximizing pressure while stretching and increasing comfort at the second stage labor.[16,23] The strength at hand is when the wrist is in a neutral position, so the mechanical load on the muscle is not substantial because it is in a neutral position.[24]

Various factors in this study can influence the duration of labor. Although the characteristics of the respondents are already homogeneous, the characteristics of uterine contractions only observe retreats on uterine contractions in the BC-MK15 birth chairs group and the conventional bed. Which is the inclusion criterion is three times uterine contractions per 10 minutes, the researchers did not follow up for observation of uterine contractions in the later stage. In the control group using the conventional bed, women may choose a skewed position in the first and second stage. The sloping position makes uterine contractions more effective. Also, contractions can also be affected by fatigue, fear, and anxiety that cause stress that affects the weakness of uterine contractions.

Uterine contraction (power) is one determinant of the progress of labor that is the source of strength resulted in opened cervical, baby expenditure, and placental release. The contraction pattern is significant, and good uterine contractions will show progress on cervical dilation and baby descent.[25] Women who are in a tilted position of uterine contractions are more effective,[26] because in the oblique position there is no emphasis on the aorta-caval that blood flow to the uterus smoothly. The birth path is parallel between the pelvis and the presentation of the fetus. The sloping position forms C curve causing the uterus and fetus to fall toward the abdomen so that the uterus, pelvis and fetal presentation form the angle between the spine and the uterus. The contraction of the uterus directing the baby that posterior pelvic facilitate the decline of the fetal head, sacrum and cogsigeus free to move backward thus increasing the anterior-posterior diameter of the pelvis.[27]

Pain that occurs can affect the condition of the mother in the form of fatigue, fear, and anxiety that cause stress. Similarly, fatigue due to sleeplessness, lack of rest experienced by the mother before delivery will cause increased pain sensation and increased anxiety, this will affect the pattern of uterine contractions.[28] Cross-sectional research results by Ebrahimzadeh et al.[25] in Iran in 100 samples showed a significant correlation between severe fatigue with uterine contraction patterns (r=0.22, p=0.026), and duration first stage increased in severe fatigue (r=0.25, p=0.014).

Fear and anxiety during labor can stimulate increased secretion of catecholamines that lead to elevated levels of hormones such as epinephrine so that uterine contractions are not in line with the cervical opening. Increased

hormone epinephrine intensifies the pain that can affect the beta receptor that affects the fall in uterine blood flow resulting in uterine in coordinates and weak uterine contractions.[26,29] Women who experience anxiety in childbirth 30% experience fear in childbirth. The traumatic experience of labor causes a longer time interval in subsequent labor. The results of a case-control study by Sydsjö et al.[30] in southeastern Sweden from 2001–2007 in 23,000 samples showed that women experiencing fear during labor increased the duration of labor 40 minutes in the active phase ($p<0.001$). Therefore, the uterine contraction should be observed.

Research on the differences in labor duration between the BC-Mk15 birth chairs and conventional bed, found shorter labor in BC-MK15 birth chairs with a total length of labor 269.42 min (4 h 49 min), this included in the normal category and not dangerous, because the partus precipitates lasted less than 3 hours since the onset of regular contractions.[31] So, the BC-MK15 birth chair may facilitate intrapartum care, and labor can do physiologically.

Conclusion

The duration of labor is shorter in the BC-MK15 birth chair than in conventional bed in multiparous.

Conflict of Interest

The authors declare no conflict of interests.

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