# Effect of the Prince of Songkla University Birthing Bed on Duration, Pain, and Comfort Level during Second-Stage Labor in Primiparous Thais

*Sasitorn Phumdoung, Boonrueing Manasurakarn, Kitti Rattanasombat, Sukit Mahattanan, Kalaya Maneechot, Benjamach Chanudom, Somboon Kaewnak*

**Abstract:** The aim of this study was to test the effectiveness of the newly created Prince of Songkla University (PSU) Birthing Bed regarding duration of second-stage labor, sensation and distress of labor pain, lower back pain, and comfort level during the second-stage of labor of primiparous Thais. The sample consisted of 240 primiparous Thais, who were block randomized into four groups and, subsequently, during labor, placed in four different types of beds (60 women per group), including the: PSU Birthing Bed without a holding bar; PSU Birthing Bed with a holding bar; usual birthing bed with head elevated 45-60 degrees; and, usual birthing bed with head elevated 15 degrees. Demographic, obstetrical and infant data were obtained via a researcher-developed data sheet. Demographic data were obtained directly from the women, while the obstetrical and infant data were obtained from the women's medical records. Information regarding each subject's experience of sensation and distress of labor pain, lower back pain and comfort level were collected via use of 100 mm Visual Analogue Scales.

Data were analyzed using descriptive statistics, ANOVA, Kruskal-Wallis test, Mann-Whitney U test, and Chi-square. Analysis revealed those who used the PSU birthing bed without the holding bar, and the PSU birthing bed with the holding bar, had a significantly lower duration of second-stage labor, less sensation and distress of labor pain, less lower back pain, and greater comfort than those who used the usual birthing bed with the head elevated 45-60 degrees and the usual birthing bed with the head elevated 15 degrees. The results indicated that use of the PSU birthing bed lowered the duration of second-stage labor, lessened the sensation and distress of labor pain, decreased lower back pain, and enhanced the comfort level of primiparous Thais during second-stage labor.

***Pacific Rim Int J Nurs Res 2013 ; 17(1) 56-67***

**Key words:** PSU birthing bed; Labor pain; Duration of second-stage labor; Comfort level; Lower back pain; Primiparous women

## Background

Even though women receive childbirth preparation,[1] labor pains may be severe, with some women complaining of feeling like their body is being split apart during delivery.[2] The most intense labor pains have been found to be experienced, especially by primiparous women, during the second stage of labor, when the uterine contractions last 60-90 seconds, every 1.5 - 2 minutes, at an intensity of

***Correspondence to: Sasitorn Phumdoung,*** *RN, PhD. Department of Obstetric Gynecological Nursing and Midwifery, Faculty of Nursing, Prince of Songkla University, Hatyai, Songkhla Province, Thailand.*
***E-mail:*** *sasitorn.ph@psu.ac.th*
***Boonrueing Manasurakarn,*** *MEng. Department of Industrial Engineering, Faculty of Engineering, Prince of Songkla University, Hatyai, Songkhla Province, Thailand.*
***Kitti Rattanasombat,*** *MD. Obstetrics and Gynecology Unit, Thasala Hospital, Thasala, Nakorn Si Thammarat Province, Thailand.*
***Sukit Mahattanan,*** *MD. Obstetrics and Gynecology Unit, Nakorn Si Thammarat Hospital, Moung, Nakorn Si Thammarat Province, Thailand.*
***Kalaya Maneechot,*** *RN, MPH. Labor Unit, Nakorn Si Thammarat Hospital, Moung, Nakorn Si Thammarat Province, Thailand.*
***Benjamach Chanudom,*** *RN, MSN. Labor Unit, Nakorn Si Thammarat Hospital, Moung, Nakorn Si Thammarat Province, Thailand.*
***Somboon Kaewnak,*** *RN. Labor Unit, Thasala Hospital, Thasala, Nakorn Si Thammarat Province, Thailand.*

70-100 mmHg, for one to two hours.[2, 3] Thus, it is no wonder that some women have felt there would be no end to the labor pains they were experiencing.[4]

Pushing during second-stage labor causes acidosis in the women and their fetuses,[5] as well as prolongs labor for expectant mothers.[6, 7] Labor prolonged of more than one hour often leads to an increased incidence of cesarean sections and third or fourth degree birth canal tears.[8] In addition, prolonged second-stage labor has been found to lead to increased use of instrument-assisted births, birth canal injuries, acidosis, and low Apgar scores in newborn infants.[9] Given that prolonged second-stage labor often causes adverse effects for expectant mothers and their fetuses, there appears to be a need to seek means to shorten the duration of second-stage labor, lower the sensation and distress of labor, and increase the comfort level of women in labor.[10]

Relatively few methods have been used to shorten the length of labor, including the use of: drugs for augmentation of labor;[11,12,13] and, use of an upright delivery position.[14,15,16] At present, oxytocin is commonly used to increase uterine contractions as a means to shorten the length of labor.[11,12] The use of oxytocin and other stimulative uterine contraction medications may cause child-bearing mothers to experience: lower cardiac output;[17,18] water intoxication;[17,18] birth canal injuries;[17,18] limitation of body movement;[17,18] increased pain and discomfort;[17,18] increased need for analgesic drugs;[19] and, tetanic contractions of the uterus,[13,19,20] which often lead to uterine rupture.[19,20,21] In addition, the prolonged use of oxytocin may lead to the expectant mothers experiencing headaches, dyspnea, hypotension, tachycardia, and postpartum hemorrhage.[22] The use of oxytocin also may lead to fetal distress[17] and hyperbilirubinemia in infants.[23]

With respect to the use of an upright delivery position, the use of standing and squatting delivery positions have been found to enhance an increase in the diameter of a woman's pelvis, and, thus, facilitate delivery.[14,15] In addition, the Prince of Songkla University Cat position (PSU Cat position), which involves alternating the height of the head of the birthing bed, while listening to music, has been found to shorten the active phase of the first stage of labor to 3.1 hours (SD = 1.9 hours).[16] During the second stage of labor, the squatting position has been effectively used to increase expectant mother's pelvic diameter, as well as facilitate rotation and fetal descent.[24] In addition, the squatting position has been found to contribute to elimination of perineal tears and decreased adverse effects on the Apgar scores of fetuses.[25] A previous study, conducted by the principal investigator (PI) and colleagues, revealed use of the Prince of Songkla University Locked-Upright position (PSU Locked-Upright position), which is similar to squatting in a lying position, significantly shortened the duration of the second stage of labor to 24.86 minutes, with legs on the stirrups, and to 28.21 minutes, with knees-to-chest.[26]

Labor positions that have been found to facilitate reduction of lower back pain and increased comfort level, during the first stage of labor, have included: an upright position;[27, 28] and, the PSU Cat position.[16] During the second stage of labor, the PSU Locked-Upright position has been found to decrease expectant mothers' lower back pain (n =24; 31.6%) and increase their comfort level (n =70; 92.1%).[26] However, no significant lowering of sensation and distress of labor pain has been shown with the PSU Locked-Upright position, compared to groups of women in labor who used a high head and supine position. The lack of significant differences in the previous study may have been because the women who used the PSU Locked-Upright position were unable, throughout labor, to maintain support to their lumbar area. Thus, it became essential to find an effective means of enabling women in labor to maintain adequate lumbar support, while in the PSU Locked-Upright position. Based upon this need and prior findings that revealed pulling against a force (i.e. towel secured to an immovable bar or object) could facilitate effective pushing, when used in the upright position, by

enhancing the abdominal muscles in expulsive efforts,[24, 29] the PSU birthing bed was constructed (with and without a holding bar present) based upon the body build of pregnant Thais. The PSU birthing bed has been considered an innovative bed for laboring women because: the head of the bed can be elevated to 45-60 degrees or more; the lumbar area of the bed can be elevated to 30-40 degrees; a holding bar is present (for use if desired) for promoting a force or power, or expulsion effort; foot support is present to facilitate knees-to-chest; and, leg stirrups are available for the legs when they are aching (see **Figure 1**).

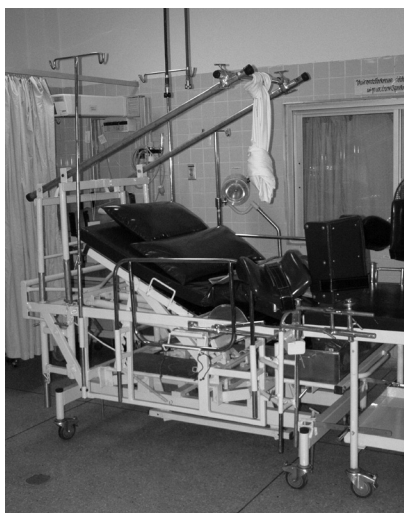

**Figure 1** The PSU Birthing Bed with the Holding Bar

Once the PSU birthing bed was constructed, its effects on women in labor needed to be tested. Thus, the purpose of this study was to investigate, in primiparous women, during the second stage of labor, the effects of the PSU birthing bed (with and without a holding bar) on: duration of labor; sensation and distress of labor pain; level of lower back pain; and, level of comfort.

## Method

***Design:*** A randomized four block design was used in the study.

***Ethical considerations***: Prior to implementation, the study was approved by the Human Ethics Committee of the PI's academic institution and the hospital used as a data gathering site. All potential subjects were informed about: the nature of the study; involuntary participation; what study participation would entail; confidentiality and anonymity issues; and, the right to withdraw at any time without repercussions. Those consenting to take part in the study were asked to sign a consent form.

***Setting and sample***: The hospital selected, as a study site, was located in southern Thailand and chosen because more than 5, 500 women give birth, yearly, at the facility. The criteria for subject inclusion were Thais who: were primiparous; were between 17 and 35 years of age; were 37 to 42 weeks of gestation; had a fetal vertex presentation; had an expected fetal weight of 2,500 to 4,000 grams; and, were able to read and write Thai. Subject exclusion criteria included pregnant women who had: anemia; hypertension; asthma; an infection; a bleeding disorder; a history or

presence of psychological problems; fetal distress; and, a prolapsed cord.

A total of 332 women consented to participate in the study and were randomly placed into four groups. The groups consisted of women who experienced labor and delivery using the: PSU birthing bed without the holding bar; PSU birthing bed with the holding bar; usual birthing bed with the head of the bed elevated 45 to 60 degrees; and, usual birthing bed with the head of the bed elevated 15 degrees. However 68 of the women had a cesarean section, either because of unprogressive labor or fetal distress, before reaching second-stage labor. Thus, only 264 women were assessed regarding the effects of the birthing bed during the second stage of labor. However, 22 of these women gave birth with vacuum extraction and two had a cesarean section. Therefore, 240 women actually completed the study (had a normal labor delivery) in which 60 of them were in each of the four groups. When the groups were compared, in regards to subject drop out, no significant differences were noted among the four groups.

The subjects had an average age of 23.38 years (SD = 4.31) and held either a: master's degree (n = 3; 1.3%); undergraduate college diploma (n = 65; 27.1%);14$^{th}$ grade vocational school diploma (n = 25; 10.4%); 12$^{th}$ grade vocational school diploma (n = 20; 8.3%); high school diploma (n = 42; 17.5%); 9$^{th}$ grade diploma (n = 57; 23.8%); 6$^{th}$ grade diploma (n = 26; 10.8%); or failed to report their level of education (n = 2; 0.8%). In addition, the subjects were Buddhist (n = 200; 83.3%) or Islamic (n = 40; 16.7%); were either housewives (n = 100; 41.7%) or working outside of the home (n = 140; 58.3%); and, had a mean family monthly income of 13,015 Baht (SD = 9,413). The vast majority (n = 224; 93.3%) received oxytocin, but not an analgesic medication. In addition 92.5% (n = 222) of them had an episiotomy. Two of the subjects experienced a third degree perineal tear, while one had a fourth degree perineal tear.

Regarding the infants, one infant, delivered on the PSU Birthing bed without the holding bar, had thin meconium staining at birth, while two delivered on each of the three other types of birthing beds (total of 6 infants) had thick meconium staining at birth. The mean birth weight of the infants was 3,060 grams (SD = 333), with most (n = 220; 91.66%) of them having an Apgar score of 9 at one minute and 10 at five minutes (n = 218; 90.83%). None of the infants had an Apgar score less than 7. When the demographic, maternal and infant data were compared among the four groups, no significant differences were found.

***Instruments:*** A researcher-developed *Demographic, Obstetrical and Infant Data Sheet (DOIDS)* was used to record information that was obtained either by interview or from reading each subject's medical record. Demographic data obtained included each woman's: age, educational level; religion; employment status; and monthly family income. Obstetrical data addressed the use of oxytocin and analgesic medication, the duration of second-stage labor, the presence of an episiotomy, and the degree of perineal tear. The infant data included the degree of meconium staining, birth weight, and Apgar scores at one and five minutes.

Sensation and distress of labor pain, lower back pain, and level of comfort, occurring during second-stage labor, were measured using a 100 mm Visual Analogue Scale (100 mm VAS). Sensation pain was defined as the unpleasant feeling of hurt in the abdomen related to the intensity of uterine contractions during the second stage of labor. Distress pain was the reported emotional distress related to the sensation of labor pain, while lower back pain was defined as the unpleasant feeling of hurt in the lower back. The level of comfort was defined as the degree of comfort felt with the body position during labor and the birthing bed used. Subjects were asked to mark on a separate 100mm VAS for each variable measured. At the left end of the

scales measuring sensation and distress of labor pain and lower back pain the anchor words of "no pain or no distress" were listed, while on the right end of the scale the anchor words of "very severe pain or very severe distress" were listed. On the analogue scale measuring the level of comfort, the anchor word on the left end of the scale was "extremely uncomfortable," while the anchor word on the right end of the scale was "relatively comfortable." To obtain a score, the distance from the left end to the 100mm line to where the subjects placed a mark, indicating the level of response, was measured in millimeters. The higher the numerical value the higher the score. Both sensation and distress pain, in prior research, has demonstrated a concurrent validity, with a categorical question in measuring pain in the active phase of labor, between 0.73 to 0.95,[30] while concurrent validity of comfort, in this study, with a categorical question was shown to be 0.97. Also, the 100 mm Visual Analogue Scale has been shown to have a high level of validity and reliability.[31] In this study, test-retest reliability was found to be as follows: sensation of labor pain = 0.98; distress of labor pain = 0.88; lower back pain = 0.80; and, level of comfort = 0.98.

***Procedure:*** Potential subjects meeting the selection criteria were identified, during the first stage of labor, by the nurses in the labor unit of the hospital used as a study site. The potential subjects then were approached by a research assistant (RA), trained in the research project protocol, who explained the purpose of the study, what study involvement would entail, and all ethical considerations. Once a woman consented to be in the study and signed a consent form, she was randomly assigned to one of the four types of beds to be used during delivery.

Once a woman was assigned to one of the four groups, the demographic portion of the *DOIDS* was completed by the RA. Upon completion of the second stage of labor, each woman was asked to complete the 100mm VASs for each of the variables (sensation and distress of labor pain, lower back pain, and level of comfort occurring during the second stage of labor). Upon completion of the delivery, the RA obtained the obstetrical and infant information for the *DOIDS* from the respective woman's medical record.

***Data analysis*:** Descriptive statistics were used to assess demographic data, duration of second-stage labor, and scores on the 100 mm VAS, while ANOVA, Kruskal-Wallis test, Mann-Whitney U test, and chi-square were used to compare differences among groups, during the second stage of labor, regarding sensation and distress of labor pain, lower back pain, and level of comfort.

## Results

As shown in **Table 1**, significantly different durations of second-stage labor were found, via ANOVA, among the women using the four different birthing beds. The Bonferroni test showed subjects using the PSU birthing bed without the holding bar and the PSU birthing bed with the holding bar had significantly shorter durations of second-stage labor than women who used the usual birthing bed lying with the head raised to 45-60 degrees and the usual birthing bed with the head elevated to 15 degrees.

**Table 1** Differences in Duration of Second-stage Labor among Women Using Four Different Birthing Beds

| Types of Beds | Duration (min.) | | $F^1$ | Post-hoc |
|---|---|---|---|---|
| | Mean | SD | | |
| 1) PSU birthing Bed without holding bar | 17.63 | 9.70 | | $1-2^{ns}$ |
| | | | | $1-3^{*}$ |
| 2) PSU birthing Bed with holding bar | 16.58 | 8.47 | $20.343^{***}$ | $1-4^{***}$ |
| | | | | $2-3^{**}$ |
| 3) Usual birthing bed with head ↑45-60$^0$ | 24.18 | 14.20 | | $2-4^{***}$ |
| | | | | $3-4^{**}$ |
| 4) Usual birthing bed with head elevated ↑15$^0$ | 31.63 | 14.22 | | |

***Note***: $^1$ = effect size of .205 and a power of 1; $^{ns}$ = non significance; $^{*}$ = p < .05; $^{**}$ = p < .01; $^{***}$ = p < .001

As shown in **Table 2**, significantly different sensations of pain during the second stage of labor were found, via ANOVA, among subjects using the four different birthing beds. The Bonferroni test showed that those using the PSU Birthing bed without the holding bar and the PSU Birthing bed with the holding bar had significantly lower sensation of pain than the women using the usual birthing bed with the head elevated to 45-60 degrees and the usual birthing bed with the head elevated 15 degrees.

**Table 2** Differences in Sensation of Pain among Women Using Four Different Birthing Beds

| Types of Beds | Duration (min.) | | $F^1$ | Post-hoc |
|---|---|---|---|---|
| | Mean | SD | | |
| 1) PSU birthing Bed without holding bar | 74.48 | 21.78 | | $1-2^{ns}$ |
| | | | | $1-3^{***}$ |
| 2) PSU birthing Bed with holding bar | 75.48 | 19.09 | $30.03^{***}$ | $1-4^{***}$ |
| | | | | $2-3^{***}$ |
| 3) Usual birthing bed with head ↑45-60$^0$ | 94.33 | 9.53 | | $2-4^{***}$ |
| | | | | $3-4^{ns}$ |
| 4) Usual birthing bed with head elevated ↑15$^0$ | 94.66 | 9.53 | | |

***Note***: $^1$ = effect size of .267 and a power of 1; $^{ns}$ = non significance; $^{***}$ = p < .001

As shown in **Table 3**, significantly different levels of distress of pain during the second stage of labor were found, via ANOVA, among the subjects using the four different birthing beds. The Bonferroni test showed that those using the PSU birthing bed without the holding bar and PSU birthing bed with the holding bar had significantly lower distress of pain than the women using the usual birthing bed with the head elevated to 45-60 degrees and the usual birthing bed with the head elevated 15 degrees.

**Table 3** Differences in Distress of Pain among Women Using Four Different Birthing Beds

| Types of Beds | Duration (min.) | | $F^{1}$ | Post-hoc |
|---|---|---|---|---|
| | Mean | SD | | |
| 1) PSU birthing Bed without holding bar | 56.55 | 28.59 | | $1-2^{ns}$ |
| | | | | $1-3^{***}$ |
| 2) PSU birthing Bed with holding bar | 52.43 | 24.16 | $20.23^{***}$ | $1-4^{***}$ |
| | | | | $2-3^{***}$ |
| 3) Usual birthing bed with head ↑45-60$^{0}$ | 80.46 | 25.62 | | $2-4^{***}$ |
| | | | | $3-4^{ns}$ |
| 4) Usual birthing bed with head elevated ↑15$^{0}$ | 80.78 | 26.09 | | |

***Note***: $^{1}$ = effect size of .204 and a power of 1; $^{ns}$ = non significance; $^{***}$ = p < .001

Since the data did not have a normal distribution, the level of lower back pain was compared via the Kruskal-Wallis test. There was a significant differences in the medians of lower back pain score among the four groups, $\chi^{2}_{(3,n=240)} = 166.74$; p <.001. Subsequent testing of each pair of the four groups, using a Mann-Whitney U test, indicated that subjects using the PSU Birthing bed without the holding bar and the PSU birthing bed with the holding bar had mean ranks significantly lower than the women using the usual birthing bed with the head elevated 45-60 degrees and the usual birthing bed with the head elevated 15 degrees ($p$ < .001). Figure 2 shows the median of lower back pain of each group using a boxplot.

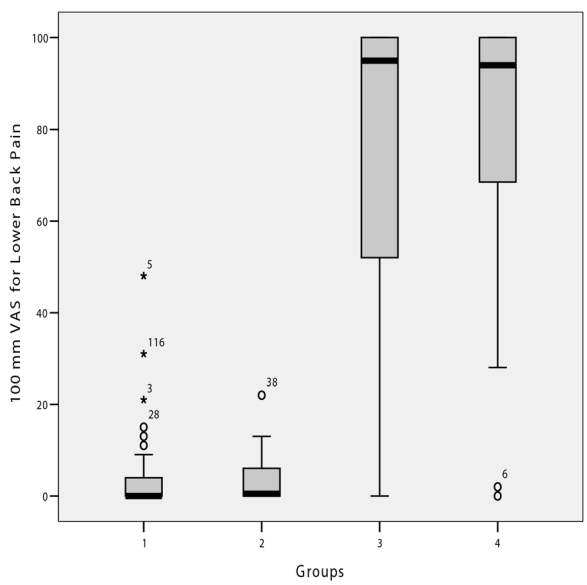


**Figure 2** Distribution of Lower Back Pain Scores during Second Stage Labor among Women Using Four Different Birthing Beds

***Note***: VAS = Visual Analogue Score; Group 1 = PSU birthing bed without the holding bar; Group 2 = PSU birthing bed with the holding bar; Group 3 = Usual birthing bed with head elevated 45-60$^{0}$; Group 4 = Usual birthing bed with head elevated 15$^{0}$

The level of comfort scores for subjects using each type of bed was strongly bimodal and, thus, could not be analyzed via the Kruskal-Wallis test. Therefore, chi-square was used. As shown in **Table 4**, the findings suggested that those using the PSU birthing bed without the holding bar and the PSU birthing bed with the holding bar had significantly higher comfort levels than the women using the usual birthing bed with the head elevated to 45-60 degrees and the usual birthing bed with the head elevated 15 degrees.

**Table 4** Frequency, Percentage, and Differences of Comfort Levels among Women Using Four Different Birthing Beds

| Comfort Score (mm.) | Groups (n = 60 per group) | | | | $\chi^2$ |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | |
| | n (%) | n (%) | n (%) | n (%) | |
| 0 | - | - | 15 (25) | 21 (35) | 192.588* |
| 1-20 | - | - | 10 (16.7) | 16 (26.7) | |
| 21-40 | - | - | 13 (21.7) | 8 (13.3) | |
| 41-60 | 2 (3.3) | 1 (1.7) | 12 (20) | 11 (18.3) | |
| 61-80 | 5 (8.3) | 4 (6.7) | 4 (6.7) | - | |
| 81-99 | 29 (48.3) | 30 (50) | 4 (6.7) | 4 (6.7) | |
| 100 | 24 (40) | 25 (41.7) | 2 (3.3) | - | |

Note: * = $p < .001$; Group 1 = PSU birthing bed without the holding bar; Group 2 = PSU birthing bed with the holding bar; Group 3= Usual birthing bed with head elevated 45-60°; Group 4= Usual birthing bed with head elevated 15°

## Discussion

The findings that the subjects using the PSU birthing bed without the holding bar and the PSU birthing bed with the holding bar had shorter durations of second-stage labor than the women using the usual birthing bed with the head elevated 45 - 60 degrees and the usual birthing bed with the head elevated 15 degrees most likely was due to the fact, as shown in prior research, that supporting the lumbar area and providing foot support can enable women to lie with a knees-to-chest position (similar to the squatting position in lying position) and can increase pelvic dimensions.[15, 26] The fact that those using the PSU birthing bed with the holding bar and the PSU birthing bed without the holding bar had similar durations of second-stage labor possibly was due to the women in the PSU birthing bed without the holding bar using the side rails of their beds as a replacement for the holding bar. It has been shown that a holding bar and bed side rails can provide a similar mechanism to enhance a force or promote power.[25] In addition, the fact that the shortened duration for second-stage labor among the subjects using the PSU birthing bed both with and without the holding bar was consistent with prior research that examined the use of the PSU Locked-Upright position[26] and the squatting position.[32] However, this study did note a shorter duration of the second-stage labor compared to the study that examined the use of the PSU Locked-Upright position.[26] This most likely was because the women, in this study, were able to lie in the PSU Locked-Upright position all the time and received more oxytocin. In comparison to previous research on the

use of the squatting position,[32] the fact that those using the PSU birthing bed (either with or without the holding bar) had a shorter duration of second-stage labor than women who used the squatting position suggested the superiority of the PSU birthing bed over use of a squatting position.

The findings that subjects using the PSU birthing bed with and without the holding bar had lower sensation and distress of labor pain during second-stage labor compared to the women who used the usual birthing bed with the head elevated 45 - 60 degrees or 15 degrees may have been due to the shorter time of second-stage labor that these women experienced. These results are inconsistent with prior research on the PSU Locked-Upright position[26] in which no differences were noted among the women who were placed in different positions during labor and delivery. This inconsistency may have been related to the facts that, in the present study, the women experienced a shorter second stage of labor, encountered more comfort, and were maintained in the PSU Locked-Upright position all of the time while on the PSU birthing bed.

The fact that women using the PSU birthing bed with and without the holding bar were found to have significantly less lower back pain and higher comfort levels than those using the usual birthing bed with the head elevated 45 - 60 degrees or 15 degrees most likely was due to the support provided by the PSU birthing bed in the women's lumbar region. As a result, muscle strain in the lumbar area was relieved and, subsequently, the level of comfort was increased. It was interesting to note that most of those using the PSU birthing bed (with and without the holding bar) experienced no lower back pain. Quite possibly this could have resulted from the support and softness of the mattress of the PSU birthing bed. The fact that less lower back pain and higher comfort levels were found among the women using the PSU birthing bed (with and without the holding bar) is consistent with prior research[26] that suggested women using the PSU-Locked Upright position during labor and delivery (a position consistently maintained by the PSU birthing bed) experience less back pain and higher levels of comfort than women not using such a position. These findings also are consistent with the clinical suggestions that support to the lumbar area, via a pillow, can lower muscle strain in the lower back.[33]

The results of this study indicated the PSU birthing bed is an innovative bed that can decrease the duration of second-stage labor, sensation and distress of labor pain, and lower back pain, as well as enhance the comfort level of women in labor. Thus, it would be advisable to consider the use of the PSU birthing bed to enhance a more positive labor and delivery experience.

## Limitations and Recommendations

Like all studies, the limitations of the study need to be taken into consideration when applying the findings. First, most of the women, in all four groups in this study, received oxytocin. Thus, the duration of their second-stage labor may have been reduced. This factor poses some limitations in inferring to the general population of women experiencing labor and delivery. Future research needs to examine the effects of the PSU birthing bed on the duration of second-stage labor among women who do not receive oxytocin. Secondly, only primiparous women were included in the study. Future research needs to consider the use of women who are multiparous.

## Acknowledgements

The authors gratefully acknowledge the financial support received from Prince of Songkla University for implementation of this study.

## References


1. Melzack R, Taenzer P, Feldman P, Kinch RA. Labour is still painful after prepared childbirth training. Can Med Assoc J. 1981; 125: 357-63.
2. Olds SB, London ML, Ladewig PAW. Maternal-newborn nursing: A family and community-based approach. 6th ed. Upper Saddle River (NJ): Prentice Hall Health; 2000.
3. Lowe NK. Individual variations in childbirth pain. J Psychosom Obstet Gynaecol. 1987; 7:183-92.
4. Beck CT. Women's temporal experiences during delivery process: A phenomenological study. Int J Nurs Stud. 1994; 31: 245-52.
5. Blackburn ST, Loper DL. Maternal, fetal, and neonatal physiology: A clinical perspective. Philadelphia (PA): WB Saunders Company; 1992.
6. Parnell JC, Langhoff-Roos J, Iversen R, Damgaard P. Pushing method in the expulsive phase of labor: A randomized trial. Acta Obstet Gynecol Scand. 1993a; 72: 31-5.
7. Parnell JC, Langhoff-Roos J, Iversen R, Damgaard P.Pushing technique in the expulsive phase of labor. A randomized study. Ugesker Laeger. 1993b; 155: 2259-62.
8. Cheng YW, Hopkins LM, Caughey AB. How long is too long: Does a prolonged second stage of labor in nulliparous women affect maternal and neonatal outcomes?. Am J Obstet Gynecol. 2004; 191: 933-38.
9. Gerber S, Vial Y, Hohlfeld P. Maternal and neonatal prognosis after a prolonged second stage of labor. J Gynecol Obstet Biol Reprod. 1999; 28: 145-50.
10. Roberts JE. A new understanding of the second stage of labor: Implications for nursing care. J Obstet Gynecol Neonatal Nurs. 2003; 32: 794-801.
11. Smith JG, Merrill DC. Oxytocin for induction of labor. Clin Obstet Gynecol. 2006; 49:594-608.
12. Svardby K, Nordstrom L, Sellstrom E. Primiparas with or without oxytocin augmentation: A prospective descriptive study. J Clin Nurs. 2007; 16: 179-84.
13. National Women's Health Clinical Guideline: Oxytocin (syntocinon) for induction & augmentation of labour. 2008 [cited 2013 Jan 6]; Available from: http://nationalwomenshealth. adhb.govt.nz/ Portals/0/ Documents/Policies/Oxytocin%20 Syntocinon%20 Augmentation% 20Labour_pdf.
14. Liu Y C. The effects of the upright position during childbirth. Image J Nurs Sch. 1989; 21:14-8.
15. Lilford RJ, Glanville JN, Gupta JK, Shrestha R, Johnson N. The action of squatting in the early postnatal period marginally increases pelvic dimensions. Br J Obstet Gynaecol. 1989; 96: 964-6.
16. Phumdoung S, Youngvanichsate S, Jongpaiboonpatana W, Leetanaporn R. The effects of the PSU Cat position and music on length of time in the active phase of labor and labor pain. Thai J Nurs Res. 2007; 11: 96-105.
17. Pozaic S. Induction and augmentation of labor. In Mandeville LK, Troiano NH, editors. High-risk and critical care intrapartum nursing. 2nd ed. Philadelphia (PA): Lippincott; 1999. p. 139-58.
18. Sandoz Pharmaceuticals Corporation. Syntocinon-oxytocin injection, solution. [cited 2012 Jun 10]; Available from: http://dailymed.nlm .nih.gov/ dailymed/ drugInfo.cfm?id=1587.
19. Harper B. Gentle birth choices. Rochester (VT): Healing Arts Press; 2005.
20. The Clinician Ultimate Reference. Intravenous dilution guidelines: oxytocin. [cited 2013 Jan 6]; Available from: http://www.globalrph.com/oxytocin_dilution.htm.
21. Barger M K, Weiss J, Nannini A, Werler M, Heeren T, Stubblefield PG. Risk factors for uterine rupture among women who attempt a vaginal birth after a previous cesarean: A case control study. J Reprod Med. 2011; 56: 313-20.
22. National Women's Health Clinical Guideline. 2008. Oxytocin (syntocinon) for induction & augmentation of labour. Auckland District Health Board. NMP200/ SSM/014.
23. Trotman H, Henny HC. Factors associated with extreme hyperbilirubinaemia in neonates at the University Hospital of the West Indies. Paediatr Int Child Health. 2012; 32: 97-101.
24. Adams ED, Bianchi A. A practical approach to labor support. J Obstet Gynecol Neonatal Nurs. 2008; 37: 106-15.
25. Nasir A, Korejo R, Noorani K J. Childbirth in squatting position. J Pak Med Assoc. 2007; 57: 19-22.
26. Phumdoung S, Morkruengsai S, Tachapattarakul S, Lawantrakul J, Junsuwan, P. Effect of the Prince of Songkla University Locked-Upright position on the duration, pain, and comfort of second-stage labor in primiparous women. Pacific Rim Int J Nurs Res. 2010; 14: 112-21.

27. Malzack R, Belanger E, Lacroix R. Labor pain: Effect of maternal position on front and back pain. J Pain Symptom Manag. 1991; 6: 476-80.
28. Mendez-Bauer C, Arroyo J, Ramos CG, Menendez A, Lavilla M, Izquierdo F, *et al*. Effects of standing position on spontaneous uterine contractility and other aspects of labor. J Perinat Med. 1975; 3: 89-100.
29. Murray, S. 2006. Normal force and friction. [cited 2012 Jul 27]; Available from: http://www.cstephenmurray.com/Acrobatfiles/aphysics/PreAP/Chapter4/CalculatingNormalForceandFriction.pdf.
30. Phumdoung S, Good M. Music reduces sensation and distress of labor. Pain Manag Nurs. 2003; 4: 54-61.
31. Youngblut JM, Casper GR. Single-item indicators in nursing research. Res Nurs Health. 1993; 16: 459-65.
32. Golay J, Vedam S, Sorger L. The squatting position for the second stage of labor: Effects on labor and on maternal and fetal well-being. Birth. 1993; 20: 73-8.
33. Neuberg R. Obstetrics: A practical manual. New York (NY): Oxford University Press; 1995.

# ผลของเตียงคลอด PSU ต่อระยะเวลา ความปวด และความสุขสบายในระยะที่ 2 ของการคลอดในมารดาไทยครรภ์แรก

*ศศิธร พุมดวง, บุญเรือง มานะสุรการ, กิตติ รัตนสมบัติ, สุกิจ มหัธนันท์, กัลยา มณีโชติ, เบญจมาศ จันทร์อุดม, สมบูรณ์ แก้วนาค*

**บทคัดย่อ :** การศึกษานี้มีวัตถุประสงค์เพื่อทดสอบผลการใช้เตียงคลอด PSU (Prince of Songkla University) ที่ประดิษฐ์ขึ้นต่อระยะเวลาในระยะที่ 2 ของการคลอด ความปวดและความตึงเครียดจากการปวด การปวดหลังส่วนล่าง และความสุขสบายของมารดาไทยครรภ์แรกในระยะที่ 2 ของการคลอด

กลุ่มตัวอย่างประกอบด้วยมารดาไทยครรภ์แรกจำนวน 240 ราย ซึ่งได้รับการสุ่มแบบบล็อกกลุ่มละ 60 ราย สุ่มมารดาเป็น 4 กลุ่มคือ กลุ่มใช้เตียงคลอด PSU ไม่มีบาร์โหน กลุ่มเตียงคลอด PSU มีบาร์โหน กลุ่มเตียงคลอดปกติศีรษะสูง 45-60$^0$ และ กลุ่มเตียงคลอดปกติศีรษะสูง 15$^0$ เก็บข้อมูลด้านประชากร ด้านสูติศาสตร์และด้านทารกโดยใช้แบบสอบถามที่สร้างขึ้น ข้อมูลด้านประชากรได้จากการซักถามมารดา ข้อมูลด้านสูติศาสตร์และทารกได้จากแบบบันทึกในห้องคลอด เก็บข้อมูลประสบการณ์ความปวด ความตึงเครียดจากความปวด การปวดหลังส่วนล่าง และความสุขสบายโดยใช้มาตรวัดด้วยสายตา (100 mm VAS)

วิเคราะห์ข้อมูลโดยใช้สถิติบรรยาย, ANOVA, Kruskal-Wallis test, Mann-Whitney U test และ Chi-square ผลการวิเคราะห์ข้อมูลพบว่ามารดาที่ใช้เตียงคลอด PSU ไม่มีบาร์โหน และ เตียงคลอด PSU มีบาร์โหน มีระยะเวลาในระยะที่ 2 ของการคลอด ความปวดและความตึงเครียดจากการปวดและการปวดหลังส่วนล่างน้อยกว่าและมีความสุขสบายมากกว่ามารดากลุ่มใช้เตียงคลอดปกติศีรษะสูง 45-60$^0$ และกลุ่มใช้เตียงคลอดปกติศีรษะสูง 15$^0$ อย่างมีนัยสำคัญ

กล่าวได้ว่าเตียงคลอด PSU เป็นเตียงที่ช่วยย่นเวลาในระยะที่ 2 ของการคลอด ลดปวด ลดความตึงเครียดจากการปวด ลดการปวดหลังส่วนล่าง และเพิ่มความสุขสบายให้กับมารดาไทยครรภ์แรกในระยะที่ 2 ของการคลอด

***Pacific Rim Int J Nurs Res 2013 ; 17(1) 56-67***

**คำสำคัญ:** เตียงคลอด PSU; การเจ็บครรภ์; เวลาของระยะที่ 2 ของการคลอด; ความสุขสบาย; การปวดหลัง ส่วนล่าง; มารดาครรภ์แรก

***ติดต่อที่: ศศิธร พุมดวง***, *RN, PhD. ภาควิชาการพยาบาลสูติ-นรีเวชและผดุงครรภ์ คณะพยาบาลศาสตร์ มหาวิทยาลัยสงขลานครินทร์ อำเภอหาดใหญ่ จังหวัดสงขลา ประเทศไทย* ***E-mail:*** *sasitorn.ph@psu.ac.th*
***บุญเรือง มานะสุรการ,*** *MEng. ผู้ช่วยศาสตราจารย์ คณะวิศวกรรมศาสตร์ มหาวิทยาลัยสงขลานครินทร์ อำเภอหาดใหญ่ จังหวัดสงขลา ประเทศไทย*
***กิตติ รัตนสมบัติ,*** *MD. ผู้อำนวยการโรงพยาบาลท่าศาลา อำเภอท่าศาลา จังหวัดนครศรีธรรมราช ประเทศไทย*
***สุกิจ มหัธนันท์,*** *MD. หัวหน้าแผนกสูติ-นรีเวช โรงพยาบาลมหาราชนครศรีธรรมราช อำเภอเมือง จังหวัดนครศรีธรรมราช ประเทศไทย*
***กัลยา มณีโชติ,*** *RN, MPH. หัวหน้าห้องคลอด โรงพยาบาลมหาราชนครศรีธรรมราช อำเภอเมือง จังหวัดนครศรีธรรมราช ประเทศไทย*
***เบญจมาศ จันทร์อุดม,*** *RN, MSN. พยาบาลห้องคลอด โรงพยาบาลมหาราชนครศรีธรรมราช อำเภอเมือง จังหวัดนครศรีธรรมราช*
***สมบูรณ์ แก้วนาค,*** *RN. หัวหน้าห้องคลอด โรงพยาบาลท่าศาลา อำเภอท่าศาลา จังหวัดนครศรีธรรมราช*