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ORIGINAL RESEARCH

Prolonged Second Stage of Labor in Thai Women: A Retrospective Cohort Study

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Objective: To assess the natural course of the second stage of labor in Thai women.

Methods: A retrospective cohort study was conducted on singleton pregnancies during the second stage of labor, which were categorized into prolonged and non-prolonged groups using group-specific 95th-percentile cut-offs for nulliparous and multiparous women. The natural course of the second stage was evaluated, and adverse delivery outcomes were compared between the two groups.

Results: When the 95th percentile was used to define prolonged second stages, durations of 80 and 58 minutes were the appropriate cut-offs for nulliparous and multiparous women, respectively, substantially shorter than those reported in other ethnic groups. Overall cesarean section rate (CSR) was very low (1.4%), with most of them performed in the prolonged group. After adjusting for confounders, a prolonged second stage was an independent risk of CSR (odds ratio: 175 and 221 for nulliparous and multiparous, respectively), operative vaginal delivery, low Apgar scores, and postpartum hemorrhage in both nulliparous and multiparous women. Cesarean deliveries were performed significantly earlier among multiparas but the CSR was comparable.

Conclusion: The second stage of labor in Thai women is markedly shorter than that reported in Western populations. The definition of a prolonged second stage should be tailored to specific ethnic populations, and the current ACOG/SMFM criteria may not be appropriate for Thai women. Among the Thai population, cut-off values of 80 minutes for nulliparous women and 60 minutes for multiparous women may be appropriate for defining a prolonged second stage. A prolonged second stage markedly increased the rates of cesarean section rate, operative vaginal delivery, low Apgar scores and postpartum hemorrhage. However, the overall cesarean rate during the second stage remained very low in Thai women.

Keywords: cesarean section, delivery outcome, prolonged second stage, second stage of labor

Introduction

Since 2015, we have adopted the labor management guidelines recommended by ACOG,[1] which advise that, arrest of labor in the second stage should not be diagnosed until the following thresholds are met: at least 2 hours of pushing in multiparous women and at least 3 hours in nulliparous women. Longer durations may be appropriate on an individualized basis (eg, in cases of epidural analgesia or fetal malposition), provided that progress is documented. This approach is intended to reduce unnecessary cesarean deliveries by allowing extended pushing beyond conventional time limits. However, the decision to allow continued pushing must be carefully balanced against the potential risks of maternal and neonatal complications, as reported in previous studies.[2–4]

The duration of the second stage of labor can be influenced by multiple factors. In particular, nulliparity and epidural anesthesia are strongly associated with a longer second stage.[5–8] Additionally, birth weight, maternal age at delivery, and the time period in which the delivery occurred (across different decades) have all been shown to significantly affect second-stage duration.[6] Furthermore, ethnicity may also play an important role, as evidenced by variations in

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reported durations across diverse geographical populations.[5,6,9] We hypothesized that the natural course of the second stage of labor among Thai women may differ from that observed in Western populations, upon which most published guidelines are based. Such differences could potentially lead to changes in the diagnosis of prolonged second stage of labor in our population and influence subsequent management decisions. Moreover, the appropriateness of applying such definitions to Thai parturients remains uncertain. Our clinical experience suggests that prolonged second stage, defined as exceeding two hours, is extremely rare in our practice. This important observation prompted us to investigate this issue systematically to obtain scientific evidence that could help inform and improve clinical practice. To the best of our knowledge, no studies have reported on the duration of the second stage of labor in the Thai population. Given that Thai women generally have smaller body size and differing pelvic anatomy, together with smaller fetuses, this study was conducted to assess the natural course of the second stage of labor in Thai women and also compare labor outcomes between women with prolonged versus non-prolonged second stages.

Patients and Methods

This retrospective cohort study was conducted using data from the obstetric electronic database and medical records of the Department of Obstetrics and Gynecology, Chiang Mai University, Thailand. The database, which includes prospectively recorded data of pregnant women who delivered at our hospital, a tertiary referral center, has been systematically maintained since 1992, with entries made on the day of discharge. Ethical approval for this study was obtained from the Institutional Review Board, Faculty of Medicine, Chiang Mai University (Research Ethics Committee Panel 5; Research ID: OBG-2567-0686; Date of Approval: 30 January 2025). The database was initially accessed to retrieve all consecutive records of women who gave birth between 2014 and 2024. Records were included if they met the following criteria: (1) singleton pregnancy; (2) vertex presentation; (3) gestational age greater than 24 weeks; and (4) successful labor progression reaching the second stage or full cervical dilatation. Exclusion criteria were multifetal pregnancies, cesarean delivery due to any indication prior to full cervical dilatation, serious medical or obstetric complications requiring shortening of the second stage, severe fetal anomalies or intrauterine fetal demise, and incomplete outcome data. Records with questionable or uncertain information, such as unclear timing of full dilatation or delivery, or implausible values (eg, maternal age of 200 years or a second stage duration of six hours), were reviewed using complete medical records.

Eligible patients were categorized into two groups: the study group (prolonged second stage, defined as delivery occurring more than two hours after full cervical dilatation) and the control group (non-prolonged second stage, defined as delivery within two hours after full dilatation).

Demographic and clinical characteristics (eg, maternal age, parity, underlying medical conditions) and obstetric outcomes (eg, maternal complications, gestational age at birth, fetal anomaly, mode of delivery, and neonatal outcomes) were validated, extracted, and digitally recorded. The primary outcomes included the rates of cesarean section, operative vaginal delivery, low Apgar scores at 1 and 5 minutes, postpartum hemorrhage, and postpartum morbidity. The definitions used in this study were as follows: 1) Prolonged second stage was defined as a second-stage duration exceeding the 95th percentile, using group-specific threshold cut-offs for nulliparous and multiparous women in our cohort. 2) Postpartum hemorrhage was defined as blood loss exceeding 500 mL within 24 hours after delivery, primarily assessed by clinical estimation and the use of a calibrated blood-collecting delivery bag. 3) Low Apgar score was defined as a score of <7 at 5 minutes. 4) Postpartum morbidity included wound infection and dehiscence, as well as puerperal infections, which were diagnosed clinically by the attending physician.

Statistical Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software, version 26.0 (IBM Corp., Released 2019; IBM SPSS Statistics for Windows, Version 26.0, Armonk, NY, USA). Descriptive statistics are presented as mean ± standard deviation (SD) or median with interquartile range for continuous variables, depending on their distribution, and as percentages for categorical variables. Baseline characteristics between the two groups were compared using Student's *t*-test or the Mann–Whitney *U*-test for continuous variables as appropriate, and the chi-square test for categorical variables. For outcome comparisons, relative risks with 95% confident intervals were calculated.

Univariable and multivariable logistic regression analyses were conducted to identify potential risk factors for the primary outcomes. A p-value of < 0.05 was considered statistically significant.

Results

During the study period, a total of 15,251 parturients were initially assessed, of whom 5,309 were excluded. The remaining 9,942 cases were included in the final analysis, as illustrated in Figure 1. Among these, 9,452 women (95%) were classified as the control group (non-prolonged second stage), while 490 women were classified as the study group, (prolonged second stage). Based on the 95th percentile of second-stage duration, a cut-off of 80 minutes for nulliparous women and 58 minutes for multiparous women was used to define a prolonged second stage. The median (interquartile range [IQR]) duration of the second stage for all women was 18 (10–30) minutes. A significant difference was observed between nulliparous and multiparous women, with median durations of 23 and 14 mins, respectively (Mann–Whitney *U*-test; $p < 0.001$).

Baseline and obstetric characteristics between the two groups showed minimal but statistically significant differences across most variables, as presented in Table 1. It is noteworthy that the rates of prolonged second stage were not significantly different between nulliparous and multiparous women when group-specific 95th-percentile cut-off values were applied. Notably, the rate of successful vaginal delivery was strikingly higher in the non-prolonged group compared to the prolonged group (99.8% vs 75.9%; $p < 0.001$).

Table 2 presents a comparison of the main adverse outcomes between the non-prolonged and prolonged second-stage groups in all women. The cesarean section rate (CSR) was much higher in the prolonged group compared to the non-prolonged group (24.1% vs 0.2%; $p < 0.001$) with a relative risk of 126. Overall, the total number of cesarean deliveries during the second stage (prolonged + non-prolonged) was 136 cases (1.4%), while the vast majority of women, 9,806 cases (98.6%), achieved vaginal delivery. We noted that if a prolonged second stage is defined as exceeding two hours regardless of parity, the cesarean section rate within the first two hours of the second stage is only 0.7%. Additionally,

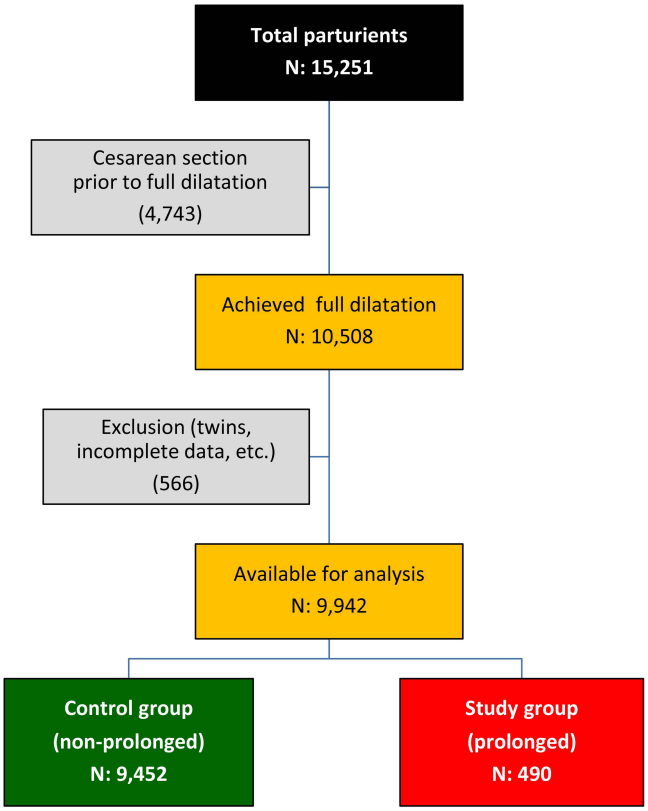

Figure 1 Flowchart of the patient recruitment.

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Table 1 Demographic Data of the Two Groups

	Not Prolonged Second Stage (N: 9,452)	Prolonged Second Stage (N: 490)	P-value
Continuous variables; mean±SD			
Maternal age (years)	28.9±6.1	30.6±5.5	< 0.001
Gestational age at delivery (weeks)	38.4±2.3	39.0±1.7	< 0.001
Birthweight (gm)	2944±533	3165±448	< 0.001
Placental weight (gm)	577±130	637±141	< 0.001
Estimated blood loss (mL)	241±162	379±243	< 0.001
Categorical variables; n (%)			
Parity: • Nulliparous • Multiparous	 4,445 (47.0%) 5,006 (53.0%)	 233 (47.6%) 257 (52.4%)	0.822
Epidural analgesia	38 (0.4%)	7 (1.4%)	0.001
Vaginal delivery	9,434 (99.8%)	372 (75.9%)	< 0.001
Neonatal sex: Male	4823 (51.0%)	246 (50.2%)	0.716

Table 2 Comparisons of the Main Adverse Outcomes Between the Groups of Non-Prolonged and Prolonged second Stage of Labor, Including Both Nulliparous and Multiparous Women

	Non- Prolonged Second Stage N: 9452	Prolonged Second Stage N: 490	P-value	Relative Risk (95% CI)
Cesarean delivery	18 (0.2%)	118 (24.1%)	< 0.001	126.45 (77.66–205.91)
Vaginal operative delivery	492 (5.2%)	174 (35.5%)	< 0.001	6.82 (5.89–7.90)
Low Apgar scores at 1 min	561 (5.9%)	74 (15.1%)	< 0.001	2.54 (2.03–3.18)
Low Apgar scores at 5 min	165 (1.8%)	19 (4.0%)	0.018	2.24 (1.41–3.58)
Postpartum hemorrhage	420 (4.5%)	40 (10.5%)	< 0.001	2.33 (1.72–3.18)
Postpartum morbidity	95 (1.0%)	8 (1.6%)	0.181	1.62 (0.79–3.32)

rates of operative vaginal delivery, low Apgar scores and postpartum hemorrhage were significantly higher in the prolonged group. Postpartum morbidity also tended to be higher in the prolonged group, although the difference did not reach statistical significance.

In multivariable analysis, after adjustment for other potential risk factors, a prolonged second stage was identified as an independent factor associated with increased rates of cesarean section, operative vaginal delivery, low Apgar scores at 5 minutes, and postpartum hemorrhage in both nulliparous and multiparous women, as shown in Tables 3–6. Additionally, a prolonged second stage was associated with a trend toward increased postpartum morbidity, although this did not reach statistical significance, as presented in Table 7. Notably, the cesarean section rates in the prolonged second-stage group were markedly higher in both nulliparous and multiparous women, with adjusted odds ratios of 176 and 221, respectively, despite the absolute number of cesarean deliveries being relatively low (118 of 9,942; 1.2%). The overall cesarean section rate among nulliparous and multiparous women was not significantly different (1.5% [72 cases] vs 1.2% [64 cases]; chi-square p = 0.166).

Table 3 Potential Risk Factors for Cesarean Delivery

Risk Factors	Univariable Analysis		Multivariable Analysis	
	Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio	P-value
Nulliparous women				
Prolonged 2nd stage	182.66 (89.35–373.40)	< 0.001	175.67 (76.09–405.58)	< 0.001
Maternal age	1.02 (1.00–1.049)	0.020	1.01 (0.97–1.05)	0.575
Gestational age	1.19 (0.99–1.43)	0.061	1.03 (0.82–1.31)	0.755
Epidural block	0.00 (0.00–0.00)	-	0.00 (0.00–0.00)	-
Birthweight	1.00 (1.00–1.01)	< 0.001	0.99 (0.99–1.00)	0.747
Male newborn	0.97 (0.61–1.55)	0.911	1.41 (0.76–2.64)	0.278
Multiparous women				
Prolonged 2nd stage	151.17 (73.68–310.16)	< 0.001	221.11 (90.37–541.03)	< 0.001
Maternal age	1.06 (1.01–1.11)	0.015	1.02 (0.96–1.09)	0.453
Gestational age	1.02 (0.90–1.15)	0.790	0.79 (0.64–0.98)	0.031
Epidural block	0.00 (0.00–0.00)	-	0.00 (0.00–0.00)	-
Birthweight	1.00 (1.00–1.01)	0.048	1.00 (0.99–1.00)	0.136
Male newborn	1.59 (0.96–2.64)	0.074	1.83 (0.96–3.51)	0.067

Table 4 Potential Risk Factors for Operative Vaginal Delivery

Risk Factors	Univariable Analysis		Multivariable Analysis	
	Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio	P-value
Nulliparous women				
Prolonged 2nd stage	8.62 (6.48–11.47)	< 0.001	8.26 (5.95–11.47)	< 0.001
Maternal age	1.05 (1.03–1.07)	< 0.001	1.03 (1.01–1.05)	0.011
Gestational age	1.21 (1.13–1.31)	< 0.001	1.19 (1.08–1.31)	< 0.001
Epidural block	3.06 (1.31–7.15)	0.010	2.02 (0.74–5.51)	0.170
Birthweight	1.00 (1.00–1.01)	< 0.001	0.99 (0.99–1.00)	0.556
Male newborn	0.93 (0.76–1.14)	0.481	1.21 (0.95–1.53)	0.121
Multiparous women				
Prolonged 2nd stage	12.78 (9.43–17.31)	< 0.001	12.40 (8.61–17.85)	< 0.001
Maternal age	1.06 (1.04–1.09)	< 0.001	1.06 (1.03–1.09)	< 0.001
Gestational age	1.06 (0.99–1.15)	0.115	1.11 (0.99–1.24)	0.055
Epidural block	3.29 (0.73–14.78)	0.120	1.88 (0.29–12.04)	0.505
Birthweight	1.00 (0.99–1.00)	0.052	1.00 (0.99–1.00)	0.074
Male newborn	0.90 (0.70–1.16)	0.429	1.26 (0.92–1.71)	0.154

Table 5 Potential Risk Factors for Low Apgar Score at 5 minutes

Risk Factors	Univariable Analysis		Multivariable Analysis	
	Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio	P-value
Nulliparous women				
Prolonged 2nd stage	2.83 (1.49–5.42)	0.002	11.87 (5.34–26.38)	< 0.001
Maternal age	0.97 (0.93–1.01)	0.096	1.00 (0.95–1.04)	0.682
Gestational age	0.66 (0.62–0.70)	< 0.001	0.79 (0.68–0.93)	0.005
Epidural block	1.73 (0.23–12.84)	0.591	4.17 (0.49–35.42)	0.191
Birthweight	0.99 (0.99–1.00)	< 0.001	0.99 (0.99–1.00)	0.004
Male newborn	1.05 (0.68–1.60)	0.833	0.65 (0.37–1.12)	0.122
Multiparous women				
Prolonged 2nd stage	1.82 (0.87–3.80)	0.110	6.57 (2.49–17.31)	< 0.001
Maternal age	0.99 (0.96–1.03)	0.752	0.97 (0.93–1.02)	0.290
Gestational age	0.64 (0.60–0.68)	< 0.001	0.88 (0.77–0.99)	0.042
Epidural block	0.00 (0.00–0.00)	-	0.00 (0.00–0.00)	-
Birthweight	0.99 (0.99–0.99)	< 0.001	0.99 (0.99–1.00)	< 0.001
Male newborn	1.11 (0.73–1.67)	0.626	1.13 (0.64–1.98)	0.670

Table 6 Potential Risk Factors for Postpartum Hemorrhage

Risk Factors	Univariable Analysis		Multivariable Analysis	
	Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio	P-value
Nulliparous women				
Prolonged 2nd stage	2.71 (1.65–4.47)	< 0.001	1.92 (1.07–3.44)	0.030
Maternal age	1.04 (1.01–1.07)	0.004	1.03 (1.01–1.06)	0.018
Gestational age	1.07 (0.99–1.17)	0.089	0.97 (0.87–1.09)	0.670
Epidural block	3.15 (1.09–9.09)	0.034	2.02 (0.59–6.92)	0.262
Birthweight	1.00 (1.00–1.00)	0.005	1.00 (1.00–1.00)	0.050
Male newborn	0.71 (0.53–0.94)	0.017	0.61 (0.45–0.84)	0.002
Multiparous women				
Prolonged 2nd stage	2.32 (1.45–3.71)	< 0.001	1.89 (1.06–3.35)	0.030
Maternal age	1.05 (1.03–1.08)	< 0.001	1.05 (1.03–1.08)	< 0.001
Gestational age	1.02 (0.95–1.09)	0.574	0.93 (0.84–1.02)	0.134
Epidural block	0.00 (0.00–0.00)	-	0.00 (0.00–0.00)	-
Birthweight	1.00 (1.00–1.00)	0.031	1.00 (1.00–1.00)	0.008
Male newborn	0.93 (0.73–1.20)	0.586	0.89 (0.67–1.19)	0.438

Table 7 Potential Risk Factors for Postpartum Morbidity

Risk Factors	Univariable Analysis		Multivariable Analysis	
	Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio	P-value
Nulliparous women				
Prolonged 2nd stage	1.85 (0.73–4.68)	0.192	1.82 (0.70–4.73)	0.216
Maternal age	1.01 (0.98–1.04)	0.613	1.00 (0.95–1.05)	0.959
Gestational age	1.15 (0.96–1.37)	0.120	1.03 (0.82–1.29)	0.807
Epidural block	5.76 (1.34–24.73)	0.019	2.50 (0.33–19.14)	0.379
Birthweight	1.00 (1.00–1.00)	0.035	1.00 (1.00–1.00)	0.153
Male newborn	1.01 (0.60–1.70)	0.973	0.94 (0.53–1.65)	0.821
Multiparous women				
Prolonged 2nd stage	1.36 (0.42–4.42)	0.606	0.98 (0.23–4.12)	0.982
Maternal age	0.99 (0.94–1.05)	0.877	1.00 (0.94–1.06)	0.955
Gestational age	1.15 (0.95–1.39)	0.150	1.10 (0.87–1.41)	0.430
Epidural block	8.89 (1.14–69.45)	0.037	0.00 (0.00–0.00)	-
Birthweight	1.00 (1.00–1.00)	0.191	1.00 (1.00–1.00)	0.573
Male newborn	0.87 (0.49–1.55)	0.635	0.92 (0.49–1.72)	0.793

Discussion

Prolonged second stage of labor significantly increases the cesarean section rate (CSR), rising from less than 1% within the first two hours to over 50% in extended durations, and is also associated with a marked increase in the rate of operative vaginal delivery. However, the overall CSR during the second stage in our cohort was only 1.4%, compared to that in most previous studies (5–6%).[3,10,11] Similarly, while operative vaginal delivery rates were higher in cases of prolonged second stage (21.5% vs 6.5%), the overall rate remained relatively low at 8%. Notably, the prevalence of prolonged second stage in our study was only 5%, based on 95th percentile cut-off, much lower than the 20–30% reported in previous studies.[8,12–15] This exceptionally low rate was not due to early intervention within the first two hours, as the CSR during this period was only 0.7%. Given the very low prevalence of prolonged second stage (above the 98th percentile), it contributes minimally to the overall CSR; however, it is significantly associated with increased maternal and neonatal morbidity. Our findings suggest that the natural course of the second stage of labor may vary among different ethnic groups, possibly due to differences in maternal and fetal size and pelvic configuration. However, further studies are needed to confirm these observations. As such, the definition of prolonged second stage should be tailored to specific populations rather than applying a universal standard. While the ACOG/SMFM guidelines[1] recommend a three-hour threshold for diagnosing prolonged second stage in nulliparous women, a two-hour threshold or even 80 minutes (95th percentile) may be more appropriate for our population.

Notably, in the multivariable analysis, prolonged second stage was identified as an independent risk factor for increased CSR, operative vaginal delivery, low Apgar score at 5 minutes, and postpartum hemorrhage, as well as a trend toward increased infectious morbidity.

While the overall cesarean section rate (CSR) did not differ significantly between nulliparous and multiparous women, the duration of the second stage was significantly shorter among multiparas. Consequently, the threshold for defining a prolonged second stage was also lower in this group. Our findings support the use of distinct time criteria for defining a prolonged second stage in nulliparous versus multiparous women, consistent with current clinical guidelines. However, the definition of the time threshold may vary across ethnicities, and in our population, durations of 80 minutes

for nulliparous and 60 minutes for multiparous women, rather than the recommended 3 and 2 hours, respectively, may be more appropriate.

It is possible that shortening the diagnostic criteria for a prolonged second stage to 80 and 60 minutes for nulliparous and multiparous women, respectively, may lower the threshold for diagnosing CPD when labor is deemed prolonged, thereby contributing to an increased CSR. Nevertheless, our data indicate that although the CSR was markedly higher among women with a prolonged second stage, the absolute number of cesarean births remained very small, whereas the risks of maternal and fetal morbidity increased significantly. Importantly, a prolonged second stage does not necessarily reflect CPD; rather, it should prompt the clinician to conduct a careful and comprehensive assessment to determine the most appropriate management, whether to continue expectant care for a possible vaginal birth if pushing can safely proceed, to consider operative vaginal delivery, to optimize uterine contractions, or to diagnose CPD when present. Therefore, we believe that adopting new criteria for defining a prolonged second stage, tailored to specific ethnic populations, may contribute to improved outcomes without substantially increasing the CSR.

The findings of this study differ markedly from most previous studies regarding the duration of the second stage of labor, the proportion of women experiencing a prolonged second stage, and the CSR during this stage. If a prolonged second stage is defined using the 95th percentile as the cut-off, durations exceeding 80 minutes for nulliparous women and 60 minutes for multiparous women would be considered prolonged. In other words, only 5% of women exceeded these durations. Notably, a two-hour threshold corresponds to approximately the 98.5th percentile in our population. Therefore, applying the ACOG/SMFM definition of prolonged second stage to our population is inappropriate, as it would include less than 1% of cases. In this study, only 1.2% of women experienced a second stage lasting more than two hours—substantially lower than the rates reported by Cheng et al (31%),[8] Allen et al (18%),[14] Le Ray et al (33%),[12] Laughon et al (14%),[15] and Rouse et al (24%).[13] Moreover, the CSR during the second stage in our study was only 1.4%, with more than half of these occurring after the two-hour mark—again, much lower than the 5–6% reported in previous studies.[3,10,11] A CSR of 1.4% among only 1.2% of our second stage population, compared to 5–6% among 20–30% in Western populations, results in a negligible absolute number of cesarean deliveries. These findings highlight significant differences in the characteristics and outcomes of the second stage of labor in the Thai population compared to those reported in predominantly Western cohorts. This suggests that ethnicity, and possibly geographic region, has a substantial influence on the natural course of the second stage of labor. Variations in maternal and fetal size, as well as pelvic configuration, may contribute to these differences. Accordingly, the definition of prolonged second stage should be tailored to specific populations rather than universally applied. Importantly, this study underscores the need for cautious adoption of international guidelines in local contexts.

Strength

Unlike most previous studies, the strength of this study lies in its attempt to characterize the natural course of the second stage of labor using time-to-event analysis and to illustrate its impact on the overall cesarean section rate. The differing results observed in this study may reflect characteristics specific to women in Southeast Asia.

Limitations

The limitations of this study are as follows: 1) Despite the large cohort, the number of cases with prolonged second stage was too small to allow for subgroup analysis or comparison of outcomes with low prevalence, such as stillbirth. 2) Detailed neonatal outcomes, including rates of acidosis, NICU admission, and length of hospital stay, were not available. 3) Epidural analgesia, which is theoretically expected to influence the duration of the second stage, was used in only a small proportion of cases, resulting in insufficient statistical power to evaluate its effect. 4) Due to the retrospective nature of the study, some important data, such as the criteria for the subjective diagnosis of cephalopelvic disproportion (CPD) during the second stage, may have been less reliable. 5) We evaluated the overall duration of the second stage; however, data on the exact durations of the passive (non-pushing) and active (pushing) phases were not available. Therefore, we were unable to determine the appropriate duration of pushing required to define an abnormal second stage.

Conclusion

The second stage of labor in Thai women is markedly shorter than that reported in Western populations. The definition of a prolonged second stage should be tailored to specific ethnic populations, and the current ACOG/SMFM criteria may not be appropriate for Thai women. A prolonged second stage markedly increased the rates of cesarean section rate, operative vaginal delivery, low Apgar scores and postpartum hemorrhage. However, the overall cesarean rate during the second stage remained very low in Thai women.

Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by Research Ethics Committee 5, Faculty of Medicine, Chiang Mai University (Research ID: OBG-2567-0686; Date of Approval: 30 January 2025).

Data Sharing Statement

The datasets analyzed during the current study are available from the corresponding author (Theera Tongsong) upon reasonable request.

Informed Consent Statement

Informed consent was waived by the Research Ethics Committee because this study involved a retrospective review of anonymized medical records, and all patient information was kept strictly confidential.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest in this work.

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