

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20261611>

Original Research Article

## Revisiting active phase of labor in primigravida with the help of E-partograph

Monica Verma\*, Neetu Meshram

Department of Obstetrics and Gynecology, M. G. M. Medical College, Indore, Madhya Pradesh, India

**Received:** 29 March 2026

**Revised:** 06 May 2026

**Accepted:** 07 May 2026

**\*Correspondence:**

Dr. Monica Verma,

E-mail: [mv27sep@gmail.com](mailto:mv27sep@gmail.com)

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### ABSTRACT

**Background:** Considering various geographical variations and the changing dynamics of medical health care provision, there is a need to revise the labor curve and find a geographical area, age and gestational age specific labor curve.

**Methods:** Observational study conducted in obstetrics and gynaecology department, M.G.M. Medical College, Indore, where all laboring primigravidas after applying inclusion criteria are monitored systematically with e-partogram for fetal heart sounds, uterine contractions, cervical dilatation and foetal head descent.

**Result:** Mean dilatation at adequate contraction is 5.8 cm means that active phase started from 5 to 6 cm of cervical dilatation onwards. The mean cervical dilatation rate in the active phase was 1.06 cm/hour with lowest acceptable rate of 0.44 cm/hour. Mean interval between adequate contraction and delivery (mean active phase duration) is 5.2 hours. At the statistical limits, the 'active labor' duration was 14 hours (mean + 2 SD) and the dilation rate was 0.44 cm/hour (mean - 2 SD).

**Conclusion:** Contrary to the generally held view, this study showed that nulliparous Indian women with spontaneous labor onset have longer 'active' labor duration and, slower dilation rates. If we follow Friedman's labor norms, it could result in increased interventions. Hence, it would be sagacious to prepare a personalized labor curve for the local population served, based on their distinctive characteristics features together with shifting the definition of active phase onset to 6 cm could be beneficial in terms of unnecessary referral prevention, decreasing caesarean rates and increasing normal delivery rates.

**Keywords:** E-Partogram, Active phase of labour, Primigravida

### INTRODUCTION

Labor is "the presence of uterine contractions of sufficient frequency, duration, and intensity to cause demonstrable effacement and dilation of the cervix."<sup>1</sup> In his landmark publications, Friedman was the first to depict a labor curve and divide the labor process into several stages and phases.<sup>2,3</sup>

There have been definitions of arrest of labor and also the guidelines for deviation from standard progression of labor have been laid since the time Friedman studied the labor events in a very small size of patients. Compared to the various geographical variations and also the changing

dynamics of medical health care provision, there is a need to revise the labor curve and find a geographical area, age and gestational age specific labor curve. Therefore, the purpose of this study was to assess the labor curve and identify the point of accelerated dilatation of cervix, rate of cervical dilatation, active labor duration with the help of e-partograph, among low-risk, primigravida women of Central India with spontaneous labor onset.

### METHODS

An observational study conducted in the Department of Obstetrics and Gynecology, M. G. M. Medical College, Indore, after obtaining clearance from Institutional ethical

committee, over a period of 1 year from May 2020 to April 2021. 400 low risk primigravida patients in the study were followed systematically with e-partogram in the labor room.

**Inclusion criteria**

The inclusion criteria were primigravidas with age 18–34 years, BMI 18–25, height >145 cm, low risks (no medical condition, no pregnancy complications), gestational age between 37 weeks to 40 weeks 6 days, pregnancy with single fetus, labor not induced, cephalic presentation, approximate baby weight between 2.5 and 3.5 kg (by Hadlock formula), delivered vaginally with no adverse maternal and neonatal outcome with consent for participation in the study.

**Exclusion criteria**

The exclusion criteria were patients with preterm labor, IUGR, non-cephalic presentation, c-sections, induced and augmented labor, and medical/obstetric complications.

Fetal heart sounds, uterine contractions, cervical dilatation and fetal head descent by P/V examination, maternal pulse rate, temperature and blood pressure were monitored using e-partogram, “JANITRI FOR HOSPITALS”, is an application that works on an android/apple operating system based on modified World Health Organisation (WHO) partograph ; formerly known as “DAKSH”; which allows to register and enter the vitals of a pregnant woman and reminds to monitor the labor progress, as per the standard intrapartum protocol. Application details: - version – v3.0.3, required OS – Android 7.0 and up, offered by – JANITRI.

For statistical analysis the data were collected using e-partograph digital records and entered on Microsoft Excel spreadsheet, Nonlinear regression model was used to plot the labor curve where cervical dilatation was plotted against the duration of labor. For all the statistical analysis, we used IBM statistical package for the social sciences (SPSS) 20.2 version for window.

**RESULTS**

400 primigravida patients who delivered vaginally are included in the study results and discussions to understand the true pattern of labor progression (Table 1).

**Table 1: Demographic characteristics.**

Demographic characteristics	Mean±SD
Age (years)	25±2.6
Height (cm)	150±5.4
BMI at delivery	21.8±1.5
Gestational age (weeks)	38.5±2.6

The BMI of the primigravida patients positively correlated with the socioeconomic status (p<0.01) and the GA (p<0.014). The BW (birth weight) correlated positively with the BMI (p<0.01) and GA (p<0.01) of the mother (Table 1). Labour parameters were discussed in Table 2.

**Table 2: Labor parameters**

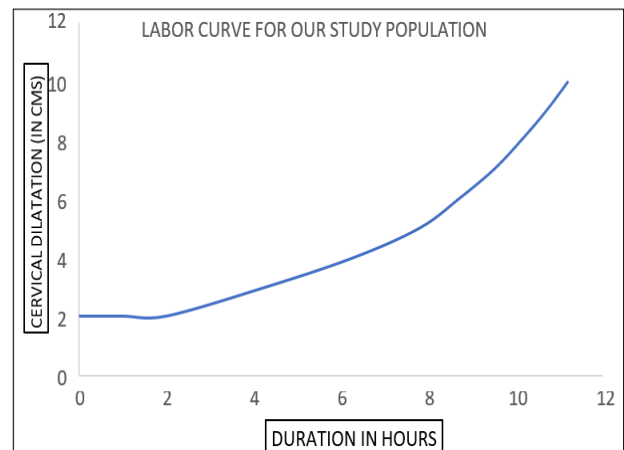
Labor parameters	Mean±SD
Cervical dilatation at admission (cm)	2.4±1.2
Cervical dilatation at adequate contraction (cm)	5.8±0.54
Interval between adequate contraction and delivery (hour)	5.2±1.5
Admission to delivery interval	15 hour 54 min±3 hours 43 min

The sex of the baby had no influence on the admission-to-delivery interval (p>0.05) and active labor duration (p>0.05) (Table 3).

**Table 3: Baby’s parameter.**

Baby’s parameter	Mean±SD
Birth weight (BW) in kg	2.7±0.48
APGAR Score	7.54±0.67

The labor curve was derived by scatter plotting: duration of labor (in hours) in X axis (each small ox an hr interval) and cervical dilatation (in cms) in Y axis (each small box 1 cm). By regression analysis, curve fitting was done. (Figure 1).



**Figure 1: Labor curve for study population.**

The mean rate of cervical dilatation was 0.85 cm/hr in latent phases with SD 0.45. Commencement of organized and adequate contractions with rapid progression of labor started at 6cm dilatation onwards (Table 4).

Hence entering the active phase of labor was considered after 6 cm dilatation. The mean cervical dilatation rate in

active phase was 1.06cm/hour with SD of 0.23. The mean duration of the latent phase was 6.12 hours and for the active phase 5.2 hours respectively. A delay in cervical dilatation between 8 and 10 cm was noted and deceleration phase was observed.

**Table 4: Cervical dilation with respect to time.**

Cervical dilatation (cm)	Mean durations (hour)	Rate of cervical dilatation
3	2.28	0.44
4	2.06	0.48
5	1.74	0.57
6	0.98	1.03
7	0.77	1.30
8	0.63	1.59
9	1.36	0.73
10	1.48	0.67
3	2.28	0.44

## DISCUSSION

### *Age group*

Comparable to Zhang's study, in this study also most primigravida patients belonged to age group of 22-25 years.<sup>4</sup> The prevalence of early marriage is more prominently seen in the States of Rajasthan, Uttar Pradesh, Bihar, Madhya Pradesh, Chhattisgarh, and Gujarat due to lack of education, poverty, constant patriarchy that encourage gender inequality, and cultural perspective.<sup>5</sup>

### *Dilatation at adequate contraction*

In Friedman study, active phase of labour starts with 3-4 cm. In women who had an active phase characterized by precipitous cervical dilation in the late 1st stage, the active phase often did not start until 5-6 cm or later.<sup>6</sup> This seems to differ materially from prevailing concepts that the active phase starts before 4 cm and 4 cm is commonly used milestone.<sup>7,2</sup>

Peisner and Rosen found that among women who had no active phase arrest, 89% women were in active phase of labor by 6 cm.<sup>8</sup> Only 50% women in their study were in active phase of labor at the traditional definition of active phase i.e 4 cm. These findings point to the fact that rather than being too mathematical and rigid with definitions, the clinicians must patiently monitor the mother and fetus and then come to clinical diagnosis of labor arrest. With no signs of maternal exhaustion or fetal distress, just waiting for nature to take its course and let the patient progress to having good adequate contractions in the presence of a good pelvis is more logical.<sup>4</sup> Our study suggests that in the local Indian population, 5-6 cm rather than 4 cm of cervical dilation may be more appropriate landmark for active phase onset, comparable to Zhang's study where active phase of labor commences at 5-6 cms.<sup>4</sup>

To make decisions easier at ground level, a change in definition of active phase of labour from 4 cm to 5-6 cm can reduce burden of attending referrals at tertiary centres and also prevent unnecessary oxytocin augmentation or instrumental deliveries.

### *Rate of dilatation*

In Friedman's, Zhang's study cervical dilatation rate after the active phase onset in nulliparous women was 3cm/hr, and 0.5 cm/hr respectively; whereas in our study it was 1.06 cm/hour.<sup>3,4</sup>

Neal et al had done a systemic review which included 18 studies of various populations, wherein they found pretty contrasting results to Friedman.<sup>9</sup> The rate of dilatation was not same for all laboring women. Rather it ranged from 0.6 cm/hour to 2 cm/hour with a mean of 1.2 cm/hour comparable to our study with slowest cervical dilatation rate of 0.44 cm/hour with mean of 1.06 cm/hour. Friedman's slowest acceptable rate was 1.2 cm/hour with mean of 3 cm/hour in active phase which is not found in recent studies.

### *Interval between adequate contraction and delivery*

Friedman's study showed, mean duration of delivery from the beginning of active phase of labor is 4.9 hours.<sup>3</sup> In Zhang's study, this is 5.5 hrs comparable to our study, (5.2 hours).<sup>10</sup> The interval is clearly more than that found by Friedman in his study. However, when starting at approximately 4 cm dilatation, around 50% of laboring women reached full cervical dilatation in 2.6 hours.<sup>3,7</sup> In our study it took around 6 hours from 4 cm dilatation to reach full dilatation.

### *Labor curve*

Friedman showed sigmoid curve was obtained after active phase onset of labor, in primigravida patients wherein they reported an acceleration followed by a deceleration phase. In Zhang's study, curve obtained is hyperbola with no deceleration phase.<sup>11</sup>

The present study's labor curve had similar features of Suzuki's curve like slower and gradual progression except existence of deceleration phase which is noticed in our study.<sup>12</sup> Both studies had similar active phase duration and similar (Asian) population.

Labor progression beyond 'active' phase is often believed to be linear. This predetermined belief contributes to the high frequency of dystocia diagnoses, unnecessary referrals and harmful interventions. In reality, dilation patterns during labor are not linear. many investigators have concluded that a sigmoid pattern develops while data from other studies suggest that a hyperbolic pattern lacking a deceleration phase predominates.<sup>2,3,7,11</sup> While the cervical dilation rate at the mean – 2 SD was 0.44 cm/hour, in our local population of primigravida, progression in the

earlier part of 'active labor' will typically be slower than this average while progression in more advanced 'active labor' will typically be more rapid.

For a more objective evaluation of labor protraction and arrest, a partogram (modified WHO) may be a useful tool, which was originally utilized to prevent prolonged and obstructed labor in developing countries.<sup>13</sup> The World Health Organisation (WHO) labor care guide (LCG) is designed to be a tool for ensuring high-quality research centered on health, reducing pointless measures, and offering comfort measures and stated that active phase begins to start at cervix dilation from 5 cm (previously in WHO modified partograph, active phase begins at 4 cm of dilatation); coinciding with the findings of our study population.<sup>14</sup>

### **Baby weight**

In Daftary's study, primigravida patients delivered vaginally with good baby weight of 2.8 kgs, comparable to our study, where mean baby weight of 2.7 kgs.<sup>9,15</sup> Neal et al studied US population's mean birth weight was 3.453±0.466 kg which was heavier than the present study birth weight (p<0.001). This emphasizes the genetic and demographic differences that lay in the various geographical areas.

### **CONCLUSION**

Our study showed that low risk nulliparous Indian women with spontaneous labor onset have longer 'active' labor duration and, hence, slower dilation rates. If we continued to follow Friedman's labor norms, it could result in unnecessary augmentation and an increase in operative intervention. A good and accurate maternal and fetal monitoring during labour can be the key to avoid untimely and incorrect decision of cesarean section. No features of maternal exhaustion or fetal distress and presence of increase in duration and intensity of contractions can become good guides to monitoring labor progression in individual patients. Changing old definition of active phase of labor and introducing the concept of individualizing the active phase of labor can reduce the referrals, decrease operative interventions and increase vaginal delivery. Hence, it would be sagacious to prepare a personalized labor curve for the local population served, based on their distinctive characteristics features together with shifting the definition of active phase of labor to 5-6 cm could be beneficial in terms of unnecessary referral, decreasing cesarean rates and increasing normal delivery rates.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

### **REFERENCES**

1. ACOG Practice Bulletin Number 49, December 2003: Dystocia and augmentation of labor. *Obstet Gynecol.* 2003;102(6):1445-54.
2. Friedman EA. The graphic analysis of labor. *Am J Obstet Gynecol.* 1954;68:1568-75.
3. Friedman EA. Primigravid labor: a graphicostatistical analysis. *Obstet Gynecol.* 1955;6:567-89.
4. Zhang J, Landy HJ, Ware Branch D, Burkman R, Haberman S, Gregory KD, et al. Contemporary patterns of spontaneous labor with normal neonatal outcomes. *Obstet Gynecol.* 2010;116(6):1281-7.
5. Times of India. Prevalence of child marriages as a part of customs in India. 2021. Available at: <https://timesofindia.indiatimes.com/readersblog/some-thoughts/prevalence-of-child-marriages-as-a-part-of-customs-in-india-37796/>. Accessed on 20 February 2026.
6. Friedman EA, Sachtleben MR. Amniotomy and the course of labor. *Obstet Gynecol.* 1963;22:755-70.
7. Friedman EA. An objective approach to the diagnosis and management of abnormal labor. *Bull N Y Acad Med.* 1972;48(6):842-58.
8. Peisner DB, Rosen MG. Transition from latent to active labor. *Obstet Gynecol.* 1986;68(4):448-51.
9. Neal JL, Lamp JM, Buck JS, Lowe NK, Gillespie SL, Ryan SL. Outcomes of nulliparous women with spontaneous labor onset admitted to hospitals in preactive versus active labor. *J Midwifery Womens Health.* 2014;59(1):28-34.
10. Zhang J, Troendle J, Mikolajczyk R, Sundaram R, Beaver J, Fraser W. The natural history of the normal first stage of labor. *Obstet Gynecol.* 2010;115(4):705-10.
11. Zhang J, Troendle JF, Yancey MK. Reassessing the labor curve in nulliparous women. *Am J Obstet Gynecol.* 2002;187(4):824-8.
12. Suzuki R, Horiuchi S, Ohtsu H. Evaluation of the labor curve in nulliparous Japanese women. *Am J Obstet Gynecol.* 2010;203(3):226.e1-6.
13. Philpott RH, Castle WM. Cervicographs in the management of labour in primigravidae. II. The action line and treatment of abnormal labour. *J Obstet Gynaecol Br Commonw.* 1972;79(7):599-602.
14. World Health Organization partograph in management of labour. World Health Organization Maternal Health and Safe Motherhood Programme. *Lancet.* 1994;343(8910):1399-404.
15. Daftary SN, Desai SV, Thanawala U, Bhide A, Levi J, Patki A et al. Programmed labour- indigenous protocol to optimize labor outcome. *South. Asian Feder Obstet Gynecol.* 2009;1:61-4.

**Cite this article as:** Verma M, Meshram N. Revisiting active stage of labor in primigravida with the help of E-partograph. *Int J Reprod Contracept Obstet Gynecol* 2026;15:2070-3.