

Analysis of labour using modified WHO partograph in primigravida in a tertiary care centre of north Kerala

Sudhya P¹, Chellamma V K², Heera Shenoy T^{3*}, Lisha Govind KV³, Jency Chembakassery¹

¹Junior Resident, Department of Obstetrics and Gynaecology, KMCT Medical College, Kozhikode, India

²Professor and Head, Department of Obstetrics and Gynaecology, KMCT Medical College, Kozhikode, India

³Associate Professor, Department of Obstetrics and Gynaecology, KMCT Medical College, Kozhikode, India

Received: 11-05-2021 / Revised: 05-06-2021 / Accepted: 16-07-2021

Abstract

Background: Partogram is a simple tool for early detection of abnormal labour. Prevention of prolonged labour reduces the risk of postpartum hemorrhage and sepsis. Here, we evaluated the use of WHO modified partograph in labour of primigravidae, its advantages, importance and any drawbacks. **Methods:** This prospective observational study was conducted at a tertiary care teaching institute from March 2020 to September 2020 at KMCT Medical college, Kozhikode. It included all the first time mothers (N = 87) with singleton term pregnancies delivered by normal labour. All the parameters were entered in partograph accordingly. Progress of labour, duration of labour, rate of cervical dilation and need for augmentation were studied. Baby's APGAR was noted at 1 and 5 minute. **Results:** The mean age of primigravida was 21.8 and the mean duration of first stage labour and second stage of labour was 4 hours & 30 minutes respectively. Mean rate of cervical dilatation – 1.21 cms/ hour. The primary caesarean rate in the study was 28% - The operative vaginal delivery rate was 14%. Patients crossing the alert line had a longer duration of labour with need for augmentation. No statistically significant association was seen with mode of delivery, maternal and neonatal outcome. An alert line cannot be used to assess satisfactory cervical dilatation according to recent WHO and ACOG guidelines. **Conclusion:** In this research, abnormal labour could be identified from partograph and corrective measures could be taken and adverse maternal outcome averted. Partograph in which the alert line was crossed did not point out to the adverse foetal and neonatal outcomes. Management of labour using partograph plotted according to new guidelines of labour will avoid unnecessary augmentation and intervention.

Keywords: Full dilatation, labour pattern, partograph, second stage CS, Arrest of descent, Primary CS

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Partogram is a simple tool[1]for early detection of abnormal labour. Prevention of prolonged labour reduces the risk of postpartum hemorrhage and sepsis and eliminates obstructed labour. A partograph is a composite graphical record of key data of mother and foetus during labour entered against time on a single sheet of paper[2]. Relevant measurements might include statistics such as cervical dilation, foetal heart rate, duration of labour and vital signs. It is intended to provide an accurate record of the progress in labour, so that any abnormality may be detected early and treated accordingly. Maternal and perinatal deaths are disproportionately higher in low and middle-income countries (LMICs) compared to high-income countries (HICs). Therefore, quality of care in LMICs should improve for reducing stillbirths, maternal and newborn deaths, compared with antenatal or postpartum care strategies[3]. The maternal mortality ratio in developing countries in 2015 is 239 per 100,000 live births compared to 12 per 100,000 live births in developed countries. A partograph recording facilitates earlier recognition of dystocia and timely intervention like amniotomy, oxytocin augmentation and caesarean section. Partograph is been used as a tool for all health professionals particularly midwives and birth attendants. Thus prolonged labour and delay in the decision and late referrals, which account for an adverse obstetric outcome is been prevented especially in an under-resourced setting.

*Correspondence

Dr. Heera Shenoy T

Associate Professor, Department of Obstetrics and Gynaecology, KMCT Medical College, Kozhikode, India

E-mail: heerarprabhu@gmail.com

Owing to resource constraints in such settings, it is usually not possible to monitor each woman continuously throughout the labour and the use of partograph serves a tool to monitor labour cost-effectively way and taking decisions on the appropriate time, including referrals. In this study, we evaluated the use of WHO modified partograph in labour of primigravidae, its advantages, importance and any drawbacks.

Aims and objectives

1. To evaluate maternal and perinatal outcomes by studying their partograph in labour.
2. To analyse the labour patterns in primigravida using the WHO partograph.
3. To study its role in early detection and prevention of abnormal labour.
4. To study the intervention done in a primigravida with abnormal labour progression detected using the WHO partograph.

Materials and methods

Study design: A prospective observational study.

Study duration: – Period of 6 months from March 2020 to September 2020.

Study population: – Total of 87 primigravidae booked with KMCT Medical College, Manassery, Calicut, were included for the study.

Sample Size: $N = Z_{2\alpha/2} \times p \times (1-p) \times D E^2 Z_{\alpha/2}$

Normal deviate for two-tailed hypothesis = 1.96.

P = Proportion or Prevalence [from previous studies] = 52.3% (Manjulatha VR, Anitha GS et al, Partograph: clinical study to assess the role of Partograph in primigravida in labour)

D = Design effect= 1 E = Margin of error = 20%

N = 87 (sample size)

Inclusion criteria

- Singleton term pregnancy
- Spontaneous labour /Induced labour
- Cephalic presentation

Exclusion criteria

- Presence suspicion / confirmation of cephalopelvic disproportion
- Cervical dilatation >7 cm
- Premature labour
- Malposition and malpresentations
- Multiple pregnancies

- Antepartum hemorrhage

Statistical methods

All statistical procedures were performed using the Statistical Package for Social Sciences (SPSS) 20.0. Calculations for power (80%) of the study was performed before the commencement of the study. All quantitative variables are expressed in mean and standard Deviation. Qualitative variables were expressed in percentages. Shapiro-Wilk test was used for testing the normality assumption of the data. Chi-square test was used to test the associations. The probability value (p value<0.005) was considered statistically significant.

Results

Comparison between spontaneous and induced labour:

Table 1:Comparison between spontaneous and induced labour

Parameters	Spontaneous	Induced	P-value
Mean age in years	21.83 ± 2.65	21.76 ± 2.04	0.93
Mean gestation in weeks	38.80 ± 0.75	38.86 ± 0.74	0.96
Augmentation required	51(68.9)	9(69.2)	0.62
Duration of 1st stage in hours	4.38 ± 1.92	3.90 ± 1.28	0.44
Duration of 2ndstage in hours	0.21 ± 0.26	0.09 ± 0.08	0.12
LSCS	19 (25.7%)	5 (38.5%)	0.17
Birth Weight	2.98 ± 0.37	3.19 ± 0.39	0.07
NICU admission	8(10.8)	0	0.25
Patients crossing alert line	19(25.7)	2(15.4)	0.34

The various outcome of spontaneous and induced labour was compared & there were nostatistically significant associations.

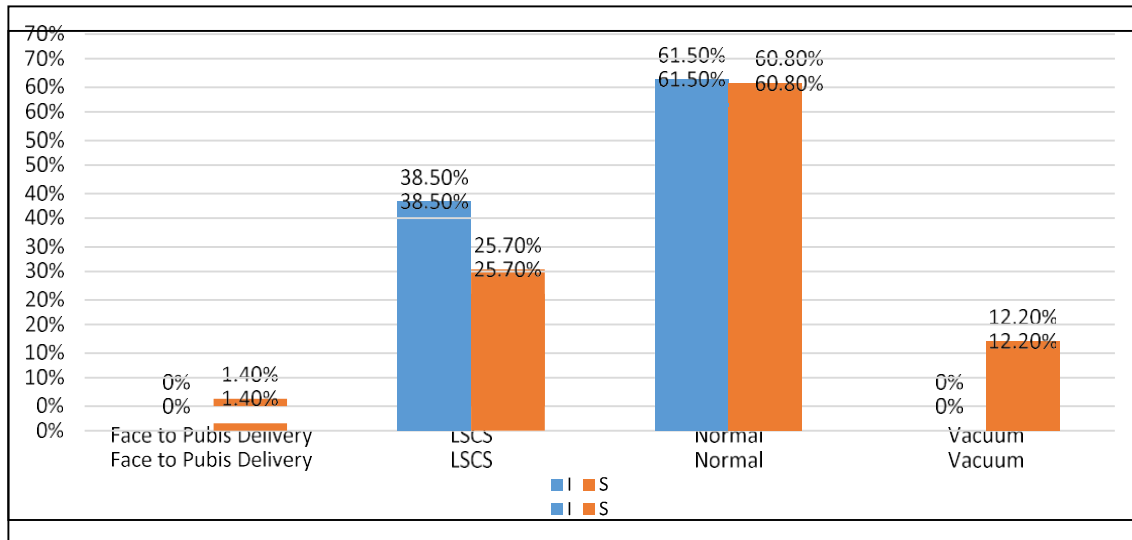


Fig 1:Association between Onset of labour and Mode of delivery:

When comparing any association between onsets of labour, there was no significant Association

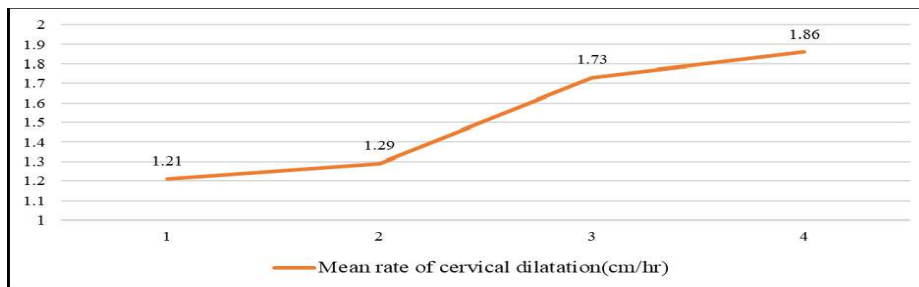


Fig 2:Graph depicting mean rate of cervical dilatation

As the point at which cervical dilatation measured increases duration of the first stage decreases and the mean rate of cervical dilatation increases. Less rate of cervical dilatation was noted from 4 cm and the maximum rate of cervical dilatation noted

Table 2: Comparison between augmentation requiring and not requiring groups

Parameters	Augmentation	No augmentation	P-value
Mean age in years	21.85±2.59	21.77±2.43	0.9
Mean gestation in weeks	38.87±0.71	38.92±0.81	0.73
Duration of 1st stage	3.77±0.31	2.94±0.44	0.13
Duration of 2nd stage	0.19±0.03	0.18±0.05	0.12
Total Duration	3.88±0.32	3.12±0.47	0.19
Birth Weight	3.02±0.34	2.99±0.44	0.7
Induced	9	4	0.62
LSCS	16	8	0.48
Crossed alert line	18	3	0.04*
NICU admission	6	3	0.62

Various parameters like duration of labour, birth weight of babies, induction needed, and mode of deliveries are compared there was no significant association. However, there was an association between augmentation needed and subjects who crossed the alert line. It revealed that, those who progressed comparatively slowly due to uterine inertia and crossed the alert line were corrected by oxytocin augmentation.

Table 3: Group-wise division of patients based on alert and action line

If the alert line crossed	N	%
Yes	21	24.1
No	66	75.9

Table 4: Comparison of patients remaining left and right to alert line

Parameters	Left	Right	P-value
Mean age in years	21.91±2.74	21.72±1.77	0.78
Mean gestation in weeks	38.84±0.75	39.22±0.47	0.04*
Duration of 1st stage	2.55±1.72	6.27±1.44	0.001**
Duration of 2nd stage	0.13±0.01	0.40±0.09	0.01*
Total Duration	2.62±1.81	6.67±1.40	0.001**
Birth Weight	3.03±0.38	3.02±0.34	0.92
Augmentation	26(61.9)	18(85.7)	0.04*
Induced	11	2	0.62
LSCS	24	0	0.48
NICU admission	6	2	0.62

Table 5: Birth weight and Mode of delivery

Mode	2.5 to 3.4 Kg	3.5 to 4 Kg	P value
LSCS	22 (91.7%)	2 (8.3%)	0.07
Normal	57 (90.5%)	6 (9.5%)	
Vacuum	6 (66.7%)	3 (33.3%)	

Mean birth weight of neonate is 3kg

Table 6: Neonatal outcome

Outcome	N	%
Birth asphyxia	1	12.5
MSAF	3	37.5
Respiratory distress	4	50
Total	8	

Discussion

Age

Maternal age was independently associated with specific adverse pregnancy outcomes. Age more 35 years old was significantly associated with miscarriage, chromosomal abnormalities and medical co-morbidities. Teenage pregnancy continues to be a major public health problem in India. The young age structure of the Indian population favors more number of adolescents in the country. In the present study, most of them are between 20 to 25 years. However, about 18 percentage is less than 19 years.

In developed countries, an increase in the average age of the gravida has been documented. Husslein et al[4,5] found that the

mean age of primiparous women in Austria was 28 years and in Germany 34 years. In a retrospective study of pregnancies delivered in a tertiary referral center done by P.Londero et al[6] found out that the mean maternal age at delivery was 31.88 years. Rukmini Sreenivasan et al[7] observed mean age of 20 years in India. In our study, adverse outcomes related to age could not be identified.

Parity

In this study, only primigravidae were included.

Gestational age

Most cases of this group delivered were in the gestational age of 39 to 40 weeks. Usually, 60 percent of birth occurs within a week

either side of the estimated date of delivery. In our study we expected no association of gestational age with the mode of delivery or adverse fetal outcome as only term pregnancies were included.

The onset of labour

This study considered both spontaneous (85%) and induced labour (15%). Induction of labour (IOL) is certainly one of the most frequently performed obstetric procedures in the world. Kim et al [8] in a retrospective, observational study of 237 nulliparous women who were at 39 or more weeks of a singleton pregnancy with vertex presentation concluded that maternal and neonatal outcomes, including the cesarean delivery rate, were similar when labour was induced at 39 or more weeks of gestation compared to spontaneous labour in uncomplicated, nulliparous women. Similarly in our study 15% of labour was induced, induction was done with dinoprostone. Maternal and neonatal outcomes following labour induction compare favorably with those achieved after spontaneous labour. The likelihood of abnormal Apgar scores, admission to the neonatal intensive care unit, or perinatal death was not significantly increased with labour induction.

Duration of the first stage of labour from 5 cm dilatation

The current consensus (WHO 2018) [9] is that the active phase is from 5 cm to full cervical dilatation and usually does not exceed beyond 12 hours in nullipara and not beyond 10 hours in multiparas. The median duration of the active first stage is 4 hours

in first labour and 3 hours in second stage of labour, when the reference starting point is 5 cm cervical dilatation. In the present study, the mean duration of the first stage is 4 hours and the maximum duration of the first stage is 8 hours, also there was no deceleration phase in the curve. In a study done by Yancey et al from 1329 nulliparous term, women after spontaneous onset of labour, the average labour curve differed markedly from the Friedman curve. The cervix dilated substantially slower in the active phase. It took approximately 5.5 hours from 4 cm to 10 cm, also observed no deceleration phase. Elaine Larson et al [11] demonstrated the mean duration of the active phase first stage duration for nulliparous Hispanic women was 6.2 hours, significantly longer than Friedman's group ($P < .01$). In an observational study done by L L Albers [12] the mean length of the active-phase, the first stage was 7.7 hours for nulliparas.

Duration of labour from various cervical dilatation

WHO 2018 recommends plotting cervical dilatation from 5cm. Present study demonstrates that cervical dilatation accelerates, as labour advances, which was similar to a study of Zhang et al, in which they observed slopes of cervical dilation progressively steeper with each passing centimeter. The mean rate of cervical dilatation in cm per hour was found to be significantly increased as the point at which initial cervical dilatation plotted increases. The following table shows the mean rate of cervical dilatation in various studies.

Table 6: Mean rate of cervical dilatation from various studies

Clinical study	N	Dilatation onset (cm)	Median duration (hr)	Rate of dilatation (cm/hr)
Fraser et al, 1993 ¹³	390	3.8	4.33	1.4
Dickinson et al, 1997 ¹⁴	240	4	2.75	2.2
Sadler et al, 2000 ¹⁵	290	4.5	4	1.4
Zhang et al, 2001 ¹⁰	507	4	6	1
Present study, 2020	87	4	5.66	1.21

Duration of the second stage of labour

The mean duration of the second stage is 1 hour in nullipara and 30 minutes in multipara (WHO 2018). In our study, the mean duration of the second stage is 30 minute. According to Larson et al, it was found that the mean duration of the second stage of labour was 54.2 minutes i.e. not significantly different from Friedman's group.

Augmentation

The rate of cesarean, induction, duration of labor and NICU admission was increased in augmentation requiring group, which was not statistically significant. There was statistically significant association between augmentation and patient crossing alert line. There was no adverse maternal or fetal outcome noted after oxytocin augmentation.

Mode of delivery

In the present study, 72% delivered vaginally and 28% by cesarean section. Of the vaginal deliveries, 14 % were vacuum deliveries. The main indication for cesarean in the present study was dystocia and it is the most common indication of primary cesarean in similar studies [16,17]. In this study, we could not find the association of cesarean with the induction of labor / augmentation.

Alert Line

In the present study, we grouped the patients into

- who does not cross the alert line
- who crossed the alert line,

Their various outcomes were compared

Maternal & neonatal outcome, mode of delivery, and birth weight of neonates had no significant association. In addition, there was no cesarean section in the group crossing alert line. So crossing the alert line was not associated with any complication in this research. In a systematic review done by Gülmezoglu et al observed the same finding that a threshold of 1 cm/hour of cervical dilatation has no

role in identifying women at risk of adverse birth outcomes. Women with shorter labour (i.e. not crossing the alert, or action, line) were not free of risk of adverse birth outcomes. In a multicentric, prospective cohort study, Gulmezoglu et al [18] also found that assessment of cervical dilatation over time is a poor predictor of severe adverse birth outcome and validity of a partograph alert line based on the 'one-centimeter per hour' rule should be re-evaluated. Also, WHO in 2018 [9] stated that there was insufficient evidence to support the use of the alert line as a classifier to detect women at risk of adverse birth outcomes.

We had a parturient who crossed the action line with uterine inertia which was corrected and had a vaginal birth.

Birth weight of newborn

A hospital-based study in coastal Karnataka concluded that the estimated average birth weight of term newborns was 3.07 kg.

In the present study, 80 % of babies weighed 2.5 to 3.5 kg while only nine percent were in the low birth weight group and none had macrosomia. Lesley McCowan et al [19] in a study conducted in the National Women's Hospital database New Zealand delivered at term, the mean birth weights of the different ethnic groups were observed. There was no association with mode of delivery and birth weight of babies as the majority of the weight of the babies born were of average birth weight in this study.

Gender of the baby and Neonatal outcome

Almost 50 % in the present study baby born are females. Eight babies were shifted to NICU, 50% of admission was for respiratory distress. There was no perinatal mortality.

Conclusion

Partogram is a simple inexpensive and highly effective tool for closely monitoring labour. Partogram could predict

- Abnormal labour pattern
- Maternal and perinatal outcomes

3. Mode of delivery, need for augmentation of labour .

Here we could identify the abnormal labour patterns from partogram and on adopting the corrective measures , adverse maternal outcomes were averted. Management of labour using partogram plotted according to new guidelines of labour will essentially avoid unnecessary augmentations and intervention. Partogram once plotted

is a document, helps both to retrospectively visualize the various aspects of labour and also for research purposes.

Ethical approval

The study was approved by the Institutional Ethics Committee

References

1. Lavender T, Hart A, Smyth RM. Effect of partogram use on outcomes for women in spontaneous labour at term. Cochrane database of systematic reviews. 2008;4:1
2. 4. Konar H. DC Dutta's Textbook of obstetrics. JP Medical Ltd; 2015.;607.
3. Bhutta Z, Das J, Bahl R, Lawn J, Salam R, Paul V et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost?. The Lancet. 2014;384(9940):347-370World Health Organization. WHO recommendations on intrapartum care for a positive childbirth experience. World Health Organization; 2018 Jun 25.
4. Nair A, Devi S. Obstetric outcome of teenage pregnancy in comparison with pregnant women of 20-29 years: a retrospective study. Int J Reprod Contracept Obstet Gynecol. 2015; 4(5):1319-23.
5. Franz MB, Husslein PW. Obstetrical management of the older gravida. Women's Health. 2010 May;6(3):463-8.
6. Londero AP, Rossetti E, Pittini C, Cagnacci A, Driul L. Maternal age and the risk of adverse pregnancy outcomes: a retrospective cohort study. BMC pregnancy and childbirth. 2019 Dec 1;19(1):261.
7. Kim HI, Choo SP, Han SW, Kim EH. Benefits and risks of induction of labor at 39 or more weeks in uncomplicated nulliparous women: a retrospective, observational study. Obstetrics & gynecology science. 2019 ;62(1):19-26.
8. World Health Organization. WHO recommendations on intrapartum care for a positive childbirth experience. World Health Organization; 2018 Jun 25.
9. Zhang J, Troendle JF, Yancey MK. Reassessing the labor curve in nulliparous women. American journal of obstetrics and gynecology. 2002;187(4):824-8
10. Jones M, Larson E. Length of normal labor in women of Hispanic origin. Journal of midwifery & women's health. 2003 ;48(1):2-9.
11. Albers LL. The duration of labor in healthy women. Journal of Perinatology. 1999 Mar;19(2):114-9.
12. Fraser WD, Marcoux S, Moutquin JM, Christen A, Canadian Early Amniotomy Study Group. Effect of early amniotomy on the risk of dystocia in nulliparous women. New England Journal of Medicine. 1993 Apr 22;328(16):1145-9.
13. Dickinson JE, Godfrey M, Evans SF, MD JP. Factors influencing the selection of analgesia in spontaneously labouring nulliparous women at term. Australian and New Zealand journal of obstetrics and gynaecology. 1997;37(3):289-93.
14. Sadler LC, Davison T, McCowan LM. A randomised controlled trial and meta-analysis of active management of labour. BJOG: An International Journal of Obstetrics & Gynaecology. 2000 ; 107(7):909-15.
15. Ragusa A, Gizzo S, Noventa M, Ferrazzi E, Deiana S, Svelato A. Prevention of primary caesarean delivery: comprehensive management of dystocia in nulliparous patients at term. Archives of gynecology and obstetrics. 2016;294(4):753-61.
16. Freeman RK. Evaluation of cesarean delivery. American College of Obstetricians and Gynecologists Women's Health Care Physicians; 2000.
17. 18. Bonet M, Oladapo OT, Souza JP, Gülmezoglu AM. Diagnostic accuracy of the partograph alert and action lines to predict adverse birth outcomes: a systematic review. BJOG: An International Journal of Obstetrics & Gynaecology. 2019 Dec;126(13):1524-33.
18. Avabratha K. Estimation of average birth weight in term newborns: a hospital based study in coastal Karnataka. Int j contemp pediatr. 2014;1(3):1.
19. McCOWAN L, Stewart AW. Term birthweight centiles for babies from New Zealand's main ethnic groups. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2004 ;44(5):432-5.

Conflict of Interest: Nil

Source of support: Nil