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Original Research Article

Evaluate the Progress of Labour in Primigravida using WHO Simplified Partogram

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Abstract

Objective: To prospectively evaluate the progress of labour in primigravida and study the labour characteristics using WHO simplified partogram in terms of augmentation requirement, duration of labour, mode of delivery and neonatal outcome.

Methods: Partogram used in our study was WHO Simplified Partogram which included cervicograph, maternal and fetal parameters. The simplified partograph is colour coded. The area to the left of alert line in cervicograph is colored green, representing normal progress. The area to the right of action line is colored red, indicating dangerously slow progress in labour. The area in between the alert and action line is crossed amber, indicating the need for greater vigilance.

Results: In our study most of the patients were found left to alert line 258 (86.00%), 38 patients (12.67%) were found in between alert and action line and 4 patients (1.33%) were found right to action line. In between alert and action line there were 21 normal delivered and 17 were taken for LSCS.A significant difference was found on comparing group 1 and group 2 between duration of first, second stage and total duration of labour, LSCS rate and NICU admission rate.

Conclusion: In our setting, the partograph serves a simple and inexpensive tool to monitor labour in a cost-effective way. So the early recognition of any deviation from "normal" progression of labour will help to prevent or reduce undesirous maternal and fetal outcome, which brings in the importance of partogram.

Keywords: Partogram, WHO Simplified Partogram, Cervicograph, Maternal And Fetal Parameters.

Introduction

Labour represents the high point of pregnancy where most mothers approach with mixture of emotions including excitement, apprehension and sometime dread. [1] It is the culmination of months of anticipation and expectation and its outcome may cover the entire spectrum from glorious fulfillment to catastrophic loss.

The partograph (sometimes known as partogram) is usually a pre-printed paper form on which labour observations are

recorded. The aim of the partograph is to provide a pictorial overview of labour, and to alert midwives and obstetricians to deviations in maternal or fetal well-being and labour progress. Charts have traditionally contained pre-printed alert and action lines. An alert line, which is based on the slowest 10% of primigravid women's labours, signifies slow progress. An action line is placed a number of hours after the alert line (usually two or four hours) to prompt effective management of slow progress of labour.

Women die from a wide range of complications in pregnancy, childbirth or the postpartum period. Most of these complications develop because of their pregnant status and some because pregnancy aggravated an existing disease. The four major killers are: severe bleeding (mostly postpartum), infections (also mostly soon after delivery), hypertensive disorders in pregnancy (eclampsia) and obstructed labour.

Early detection of abnormal progress of labour and prevention of prolonged labour would significantly reduce the risk of postpartum hemorrhage and sepsis and eliminate obstructed labour, uterine rupture and sequele. The partograph (or partogram) is a simple tool that has been used for this purpose. The partogram was not created for the convenience of doctors; in fact, it was created as a tool for all health professionals including midwives and traditional birth attendants. It serves as an early warning system and assists in early decision on transfer, augmentation and termination of labour. [2]

In under resourced setting, prolonged labour, and delay in decision- making and late referrals are important causes of adverse obstetric outcome. Owing to resource constraints in such settings, it is usually not possible to monitor each woman continuously throughout the duration of the labour. In such setting, the partograph serves a simple and inexpensive tool to monitor labour in a cost-effective way. [3-5] So the early recognition of any deviation from "normal" progression of labour will help to prevent or reduce undesirous maternal and fetal outcome, which brings in the importance of partogram. In this study we will prospectively evaluate the use of simplified WHO partogram in progress of labour in primigravida. [6-8]

Materials and Methods

The present study was conducted in Netaji Subhash Chandra Bose Medical College Jabalpur Madhya Pradesh between June 2013 to October 2014 in the Department of Obstetrics and Gynaecology. It is a prospective observational study which included 300 primigravida in labour, who were selected on the basis of below mentioned inclusion and exclusion criteria.

Inclusion Criteria.

- Primigravida in labour.
- Term pregnancy (36 – 42 weeks).
- Singleton pregnancy.
- Cephalic presentation.

Exclusion Criteria.

- Multigravida.
- Primigravida with multiple pregnancy.
- Non cephalic presentation.
- Fetal anomaly.

An acute obstetric complications like – Antepartum hemorrhage, antepartum Eclapmsia.

1. Progress of labour was plotted on a simplified partogram, fetal and maternal parameters were noted on a proforma along with it. Labour protocol was individualized and general protocol followed in our study was:
2. Plotting on partograph was started at cervical dilatation >4 cm.
3. 4 hourly pervaginal examination was recommended, but more frequently done as per requirement.
4. Routine ARM was done.Augmentation of labour was done by amniotomy (ARM) or oxytocin or both.

5. Labour induction was done in indicated patients with severe pre-eclampsia, premature rupture of membrane, prolonged pregnancy.
6. In case of PROM, diagnosis was established with history, clinical examination and ultrasound. If patient was in labour oxytocin augmentation based on uterine contractions was done and if not in labour, induction was done. Antibiotics were given if PROM was for >12 hours.
7. Maternal pulse, blood pressure, temperature and fetal heart rate monitored and plotted on partogram.

Partogram used in our study was WHO Simplified Partogram which included cervicograph, maternal and fetal parameters. The simplified partograph is colour coded. The area to the left of alert line in cervicograph is colored green, representing normal progress. The area to the right of action line is colored red, indicating dangerously slow progress in labour .The area in between the alert and action line is crossed amber, indicating the need for greater vigilance.

1. Each small box in the partograph represents half an hour interval.
2. Initial finding of cervical dilatation was plotted on the alert line at 4 cm.
3. WHO Simplified partograph using action line 4 hours after crossing alert line was used for monitoring intrapartum details.
4. Time of pervaginal examination was noted directly below the plotting of cervical dilatation.

Observation Chart

Table 1: Distribution of cases according to age group

Age Groups	Frequency	Percent	Cumulative Percent
20 years	38	12.7	12.7
21-25 years	233	77.7	90.3
26-30 years	29	9.7	100.0
>30 years	0	0	0
Total	300	100.0	

Table 2: Distribution of patients according to gestational age

Gestational Age (weeks)	Frequency	Percent	Cumulative Percent
36	6	2.0	2.0
37	55	18.3	20.3
38	87	29.0	49.3
39	97	32.3	81.7
40	52	17.3	99.0
41	2	0.7	99.7
42	1	0.3	100.0
Total	300	100.0	

Table 3: Onset of labour.

Onset of labor	Frequency	Percent	Cumulative Percent
Spontaneous **Induced Indications**	252	84.0	100.0
Severe pre-eclampsia	6	2.0	2.7
Premature rupture of membranes	40	13.3	16.0
Prolonged pregnancy	2	0.7	0.7
Total	300	100.0	

Table 4: Comparison between spontaneous and induced labour.

Parameters	Spontaneous(252)	Induced(48)	P value
Mean Age	22.26±2.01	23.29±2.31	t=3.17; P=0.0017
Mean gestational age	38.38±1.01	39.98±1.28	t=3.56; P=0.0004
Augmentation required	152	48	<0.0001
Duration of 1st stage in hours	3.99±1.31	3.96±0.89	t=0.12; P<0.0001
Duration of 2nd stage in minutes	0.98±0.54	0.88±0.40	t=1.21; P=0.23
LSCS	18	5	P < 0.0001
Birth weight	2.79±0.23	2.76±0.23	t=0.82; P=0.41
NICU admission	34	13	Z=4.33; P<0.0001
Left to alert line	37	1	Z=8.26; P<0.0001
Pt right to action line	4	0	-

Table 5: Total duration of labour.

Total duration of labour	Freq.	Percent	Cum.
30-60 min	9	3.02	3.02
1.0-2.30 hr	16	5.37	8.39
2.31-4.0 hr	115	38.59	68.46
4.01-5.30 hr	64	21.48	29.87
5.31-7.0 hr	76	25.50	93.96
7.01-8.30 hr	15	5.03	98.99
5.31-10.0 hr	3	1.01	100.00

Table 6: Type of augmentation

	Frequency	Percent
No augmentation	103	34
Type of augmentation • ARM • Oxytocin • Oxytocin + ARM	 79 29 89	 26. 10 30
Total	300	100

Table 7: Comparison between augmentation requiring and not requiring groups

Parameters	Augmentation requiring	Augmentation not requiring	P value
Mean Age	22.35±2.13	22.59±2.02	t=0.96; P=0.34
Mean gestational age	38.50±1.11	38.45±1.03	t=0.34; P=0.73
Induced labor	45	3	Z=8.57; P<0.0001
Duration of 1st stage	3.67±1.23	4.60±1.07	t=6.39; P<0.0001

Duration of 2nd stage	0.90±0.48	1.10±0.58	t=3.06; P=0.0024
LSCS	14	9	Z=1.81; P<0.0001
Birth weight	2.74±0.24	2.86±0.19	t=4.45; P<0.0001
NICU admission	30	17	Z=2.68; P=0.007
Pt. left to alert line	17	21	Z=.92; P=0.36
Pt. right to action line.	1	3	-

Table 8: Mode of delivery

Mode of delivery	Freq.	Percent	Cum.
Normal	277	92.67	100.00
LSCS	23	7.33	7.33

Table 9: Neonatal outcome.

Neonatal outcome	No. of babies	Percentage
Apgar score <7	28	100%
Meconium aspiration	18	64%
Respiratory distress	8	28%
Birth asphyxia	1	3.5%
Still birth	1	3.5%

Table 10: Comparison of patients remaining left to alert line with patients right to alert line.

Parameters	Patients left to alert line (258)	Patients right to alert line (38)	P value	Student 't' test
Mean age (years)	23.40 ±3.21	23.65±2.29	0.3588	0.92
Gestational age (weeks)	38.44±1.25	39.24±1.45	0.0725	1.80
Induced	47	1	0.007	Chi 2 test-5.92
Augmented	182	17	0.002	Chi 2 test- 10.01
Duration of 1st stage of labour(hrs)	3.89±1.17	5.41±1.17	0.0001	8.33
Duration of 2nd stage of labour(min)	32.85±23.80	40.54±32.88	<0.0001	8.35
LSCS	2	17	<0.0001	Chi2 Test-106.56
NICU admission	3	21	0.0001	Chi2 test-3.011
Birth weight	2.74	3.01	0.0001	7.04
Total duration of labour	4.53	5.97	<0.0001	9.57

Results

Most of the patients were found to be in age group of 21-25 years (90%) with peak age around 23 years. We did not have any patients above 30 year. As per the inclusion criteria, patients were selected with gestational age ranging from 36 to 42 weeks. Most of the patients were found in 38 to 39 weeks. Only (0.3%) patients were found in >42 weeks. Mean gestational age was 39 weeks.

Duration of the first stage of labour was calculated from the time of cervical dilatation at 4 cm till it was fully dilated. Mean duration of first stage of labour was 3.31±1.445 hrs Duration of 2nd stage was calculated from the time of full dilatation of cervix to the delivery of baby. Patients who were taken for caesarean section were excluded. Mean duration of second stage of labour was 35 to 40 minutes. There is increasing cervical dilatation rate upto 7 cm beyond which there is decrease in mean rate of cervical dilatation representing deceleration phase seen in Friedman's S-curve. The total duration of labour was calculated by adding the first and second stage of labour .Total mean duration was 3.4±1.84 hrs. Out of 300 patients in 79 (26%) ARM was done , 29 (10%) required oxytocin while 89 required both ARM + Oxytocin Patients were individualized based on uterine contractions.

Significant difference was found between groups in duration of first stage of labour, induced labour and LSCS rate. Out of 300 patients 277 (92.67%) were delivered normally and 23 patients (7.33%) underwent LSCS. Most of the caesarean sections performed In the 1st stage of labour were due to fetal distress (8.70%) and arrest of dilatation (8.70%). Caesarean section performed in the 2nd stage was due to deep transverse arrest (17.39%), failure of descent (21.74%) and prolonged 2nd stage of labour (43.48%). APGAR score >7 at 5 minute was seen in 272 babies (90.67%) and APGAR score <7 was seen in 28 babies (9.33%).

28 babies had APGAR score <7 for which they were admitted in NICU for reasons of meconium aspiration were 18 (64%), respiratory distress was 8 (28%), birth asphyxia 1 (3.5%) and there was one still birth. One baby died in NICU after 5 hours accounting for 2 neonatal mortalities.

In our study most of the patients were found left to alert line 258 (86.00%), 38 patients (12.67%) were found in between alert and action line and 4 patients (1.33%) were found right to action line. In between alert and action line there were 21 normal delivered and 17 were taken for LSCS.A significant difference was found on comparing group 1 and group 2 between duration of first, second stage and total duration of labour, LSCS rate and NICU admission rate.

Statistical Analysis:

All case report forms were double key entered using MS Excel 2007 and all the inconsistencies and illogical errors were resolved before analysis. Categorical variables were presented in frequency/percentage tables and continuous variables were presented as their mean + standard duration values. Comparison between 2 x 2 contigencey table were performed using chi square and Fishers exact test as appropriate and student 't' test was used to compare two means. All the analysis was performed using SPSS 2010 for windows application.

Discussion

The partogram is used as an essential tool in the active management of labour. Use of partogram helps in early detection of any deviation from normal labour and its management. [9] The use of partogram for the management of labour clearly differentiates normal and abnormal progress of labour and identifies women who are likely to require interventions. Partogram is useful in making early

decision to transfer the patients to higher centers when labour is not progressing normally. WHO partogram contains an action line 4 hours to the right of alert line.

The present study was conducted at Netaji Subhash Chandra Bose Medical College Jabalpur Madhya Pradesh. It included 300 primigravida in labour with uncomplicated pregnancy at term. Using WHO Simplified partogram characteristics of primigravida in labour and neonatal outcome was evaluated. [10-13]

Age is a very important factor in determining the obstetrical outcome. The age of mother has a significant impact on pregnancy at both ends of reproductive spectrum. Pregnancy in teenagers is more likely to be anemic and are at increased risk of having intrauterine growth retardation, preterm labour and a high infant mortality rate. Older women are at increased risk of having gestational diabetes, placenta previa, abruptio placenta, severe pre-eclampsia. Friedman (1954) found a great impact of age on obstetrical outcome. More is the age group more are risk both for mother and fetus.The mean age in our study is 23 years which is mostly favourable age for conception with least pregnancy related complication. [14-18]

In our study the mean gestational age was 39 weeks. Most of the patients were in the gestational age of 38 – 39 weeks. Most of the evidences, including a Cochrane review of 19 trials reporting on 7984 womens (Gulmezoglu et al 2006) and meta-analysis of 16 studies (Sanchez-Ramos et al 2003) indicates that women with prolonged pregnancies have better outcome with a policy of expectant management with serial fetal monitoring. The rate of cervical dilatation was the main factor affected as the curve was shifted to the right side and these rates are comparable to those of the study conducted by Daftary and Mahtre. The duration of first stage of labour was taken by the cervical dilatation from 4 cm to 10 cm. The reason for varying duration is due to difference in cervical dilation at which the cervicograph was started to be plotted. In a study done by L-J van Bogart in South Africa where mean duration of first stage of labour was 3.98 ±1.17 hrs. [19,20]

As in Friedman's S – curve there is an increasing rate of cervical dilatation up to 7 cm beyond which there is a decrease in mean rate of cervical dilatation rate like the deceleration phase . Similar to Friedman's S-curve in our study also we found an increasing cervical dilation rate up to 7 cm beyond which there is a decrease in mean rate of cervical dilatation like the deceleration phase. [21]

Friedman and Sachtleban found more than 50% incidence of CPD among women with secondary arrest of descent. Sarkar and Paul (1990) found that the incidence was 69.7% among women with secondary arrest of descent. In Frigoletto et al (1995) vaginal delivery was 87.5% and caesarean section rate was 9.2%.[46] Another study conducted by Lopez Zeno et al vaginal delivery rate was 78% and caesarean section rate was 9.2%. A study conducted by Pattinson et al had 63% vaginal delivery rate and caesarean section rate was 16%..In our study 4 caesarean sections were performed due to deep transverse arrest .In all these patients labour dystocia in the form of fetopelvic disproportion was present either in the form of malposition (deep transverse arrest) or inadequacy of maternal pelvis (cpd) which became more apperent in 2nd stage of labour. [22,23]

According to the study done in 1979 by Chen Studd who showed the outcome of normal and dysfunctional labour in which labour progress was to the right of action line had low APGAR score at 1 and 5 minutes and delivered heavier babies by caesarean section and had to be resuscitated.[49]As the labour progress slows down which can be easily observed in partogram, the alert and action line on partogram is crossed. In Pattison's study

(2003) out of 344 patients 165 crossed the alert line. In Philpott's study (1972) 78% delivered before alert line and 14% crossed the action line. 14% of patients who crossed the action line were delivered by LSCS. In our study total 4 out of 300 patients crossed the action line (12.6%) and delivered by LSCS. [24]

To improve the accurate documentation of parameters of the partograph, there is a need to understand the problem and provide tailor-made solutions to address them and ultimately improve pregnancy outcomes. There is some evidence that appropriate use of partograph in monitoring the progress of labour could decrease delivery related complications. Various types and designs of partographs are being used at various centers. WHO introduced simplified version of partogram, for the use by skilled birth attendant. Preprinted paper versions of the partograph are available Kanagalingam D et al did a study on the management of labour. WHO next generation partograph was revolutionary step towards individualised labour care. [25]

Mandiwa C et al did documentation of the partograph in assessing the progress of labour by health care providers in Malawi's South-West zone. Dangal G et al studied preventing prolonged labor by using partograph. The aim of these studies was to determine the extent to which health care workers are making use of the partograph in monitoring the progress of labour through checking the documentation of the parameters of the partographs. It was concluded that there is poor documentation of vital parameters of the partographs. Supportive supervision to obstetric care providers and regular partograph audit could also improve documentation.

Hofmeyr GJ et al described the partograph a chart designed to provide finite referral criteria for midwives working in peripheral clinics who needed to refer women in labour to tertiary center. The partograph was globally adopted, and has been used as part of the assessment of labour progress for nearly half a century. It was recommended by the World Health Organization (WHO) in the early 1990s as a routine tool for displaying the progress of labour. Despite its global acceptance, utilization and correct completion rates as low as 31% and 3% respectively, have been reported.

Orji E et al evaluated progress of labour in nulliparas and multiparas using the modified WHO partograph. Outcome measures were total duration of labour, mode of delivery, incidence of labour augmentation, and number of vaginal examinations. Labour duration was similar in the 2 groups and cervical dilatation remained normal for most women. In both groups, the incidence of spontaneous vaginal delivery was highest among women with normal labor progress and the incidence of both labour augmentation and operative intervention increased when labour progress was delayed. Labour progress and duration were found similar for nulliparas and multiparas when monitored with the modified WHO partograph. Delay in labor progress increased the need for operative intervention and adversely affected fetal outcome.

Mukherjee S et al found Partogram an important tool in managing labour. Cervical Dilatation in cms was assessed by per vaginal examination every 2 hourly, fetal Heart Rate every 1/2 hourly, uterine contractions and maternal pulse measured every 1/2 hourly, maternal BP and temperature were measured every 4th hourly. Using WHO simplified partogram, characteristics of labour and neonatal outcome was evaluated. An alert line on partogram should be based on lower 10th centile rate of cervical dilatation of the local population. We found this rate as 1cm/hr, which corresponds to the slope of alert line on standard partogram. Based on this we conclude, simplified partogram is good enough for monitoring labour progress.

Bhuyar S et al assessed the value of partographic studies in the management of labour in primigravidae at term and to study the outcome of labour and mode of delivery. Mean duration of active phase of labour were 4.55 hrs, 6.90 hrs and 10.16 hrs in group I, group II and group II respectively. Cervical dilatation in group I, group II & group III was at the rate of 1.41 cm/hr, 0.88cm/hr and 0.59 cm/hr. respectively. It was concluded that the number of LSCS, NICU, admissions and instrumental deliveries increased in group III, as compared to group I and II. Mean duration of active phase of labour increased as the partographic curve fell to the right of alert and action line.

Similar studies by Lavender T et al on effect of partograph use on outcomes for women in spontaneous labour at term and their babies. The primary objective was to determine the effectiveness and safety of partograph use on perinatal and maternal morbidity and mortality. The secondary objective was to determine which partograph design is most effective for perinatal and maternal morbidity and mortality outcomes. On the basis of the findings of this review, we cannot be certain of the effects of routine use of the partograph as part of standard labour management and care, or which design, if any, are most effective. Further trial evidence is required to establish the efficacy of partograph use per se and its optimum design.

Fahdhy M et al did evaluation of World Health Organization partograph implementation by midwives for maternity home birth in Medan, Indonesia. Introducing the partograph significantly increased referral rate, and reduced the number of vaginal examinations, oxytocin use and obstructed labour. The proportions of caesarean sections and prolonged labour were not significantly reduced. Apgar scores of less than 7 at 1 min was reduced significantly, whereas Apgar scores at 5 mins and requirement for neonatal resuscitation were not significantly different. Fetal death and early neonatal death rates were too low to compare. A training programme with follow-up supervision and monitoring may be of use when introducing the WHO partograph in other similar settings, and the findings of this study suggest that the appropriate time of referral needs more emphasis in continuing education. Conclusion was the WHO partograph should be promoted for use by midwives who care for labouring women in a maternity home. In our study significantly fewer patients crossed the action line (1.33%) as compared to Levander et all study (51%) WHO (9.9%) and Phillpott's study (11%). The number of the primigravida, crossing the alert line in partogram studied by various authors over last 3 decades has been showing a rising tends. We have compared our results with those of Philpott's (1972) 22%, WHO (1994) 34.5%, Pattison (2003) 48%, and Levander (2006) 51.6%.

The effective implementation of evidence-based practices including the use of partograph to improve maternal and newborn outcomes is critical on account of increased institutional delivery. However, despite clear guidelines, partograph use in India is not widely practiced. Among various Indian studies, Suchika G et al studied the fetomaternal outcome and progress of labour among induced versus spontaneous labour in nulliparous women. Bhatt MJ et al did comparison of normal and abnormal labour by using Modified WHO Partograph. Bajpayee D et al worked on strengthening the use of partograph in high caseload public health facilities in India through an integrated quality improvement approach.

Conclusion:

Simplified partogram is more easier and simple by using alert line. Patients in labour who remain left to alert line or on the alert line is considered normal while any deviation to right side should be taken as an

alarming sign and are more likely to require acceleration during labour in the form of ARM and intravenous oxytocin. Any deviation from normal will warrant action from the obstetric caregivers for appropriate referrals or labour augmentation. In our setting, the partograph serves a simple and inexpensive tool to monitor labour in a cost-effective way. The integrated approach of training, mentoring, and QI can be used in similar settings to strengthen partograph use.

Declarations:

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Availability of data and material: Netaji Subhash Chandra Bose Medical College Jabalpur Madhya Pradesh

Code availability: Not applicable

Consent to participate: Consent taken

Ethical Consideration: There are no ethical conflicts related to this study.

Consent for publication: Consent taken

What this Study Add to Existing Knowledge

Insufficient monitoring of the progress of labour, which may lead to adverse pregnancy outcomes. In the meantime, in-service refresher courses on partograph use to health care workers need to be conducted regularly. Supportive supervision to obstetric care providers and regular partograph audit could also improve documentation.

Contribution by Different Authors

First author Dr Deepica Tirkey Consultant Obstrectrics & Gynaecology Marble City Hospital Jabalpur Madhya Pradesh Data collection and statistical analysis

Second and corresponding author Dr Archana Singh Associate Professor Netaji Subhash Chandra Bose Medical College Jabalpur Madhya Pradesh E-mail Concept and Guidance

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