

ORIGINAL RESEARCH

Studying the labour characteristics using WHO modified partograph in relation to augmentation requirement, duration of labour, mode of delivery and neonatal outcome

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ABSTRACT

Background: A partograph is a composite graphical record, of progress of labour and salient condition of mother and foetus. Present study was aimed to study the labour characteristics using WHO modified partograph in relation to augmentation requirement, duration of labour, mode of delivery and neonatal outcome

Material and Methods: Present study was single-center, prospective, observational study, conducted in pregnant women, Singleton pregnancy, period of gestation 37.1-42 weeks, Cephalic presentation, in spontaneous or induced labor, in first stage active phase of labor with cervical dilatation of ≤ 8 cms, willing to participate in present study. **Results:** In present study, among 100 pregnant women, majority belongs to the age group of 22 to 25 years (49%), were primigravida (78%), had 39 to 40 weeks of gestational age (40%), delivered spontaneously (53%). Majority delivered vaginally (78%); rest required Lower Segment Caesarean Section (LSCS) (22%). 9 Babies had Apgar score <7 , while 15 (15%) babies had meconium-stained liquor & 13 babies needed NICU admission. Total number of participants with NICU admission needed were 5 and 8 among normal delivery and LSCS group, difference was statistically highly significant ($P=<0.0001$). Majority belonged to group A (77% - reported at left to alert line), followed by group B (19% - found between alert and action line) & group C (4% - reported to be right of the action line).

Conclusion: Our study favours the use of the WHO modified partograph, which should become routine practice in monitoring labour for better maternal and perinatal outcome. We recommend that there should be regular in-house-training and re-training of the maternal health care providers on the use of partograph in labour management.

Keywords: Modified WHO partogram, progress of labour, maternal outcome, perinatal outcome, labour management.

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INTRODUCTION

A labour that is unduly prolonged is likely to give rise to one or more of three types of distress, namely, fetal, maternal or obstetrician's distress. 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 sequel. The partograph (or partogram) is a simple tool that has been used for this purpose.^{1,2}

A partograph is a composite graphical record, of progress of labour and salient condition of mother and

foetus.³ Use of partograph is based on the assumption that it facilitates earlier recognition of dystocia thereby optimizing the timing of appropriate interventions such as amniotomy, oxytocin augmentation or most importantly caesarean section.⁴ Prolonged and obstructed labour are one of the known avoidable causes for maternal and perinatal morbidity and mortality. The reported incidence of obstructed labour varies widely from as low as 1 % in some population up to 20% in others. About 42000 deaths or 8% of all maternal deaths in 2000 were estimated to be due to obstructed labour.⁵ Prolonged and obstructed labour is also associated with

fetal hypoxia, birth trauma, and infection resulting in intrapartum or early newborn deaths and perinatal morbidity.⁶ Therefore, prevention of obstructed labour is an important intervention towards reducing maternal and perinatal mortality and morbidity, and in achieving the Millennium Development Goals.⁷ Present study was aimed to study the labour characteristics using WHO modified partograph in relation to augmentation requirement, duration of labour, mode of delivery and neonatal outcome.

MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in Department Of Obstetrics and Gynecology, Rajashree Chatrapathi Shahu Maharaj Government Medical College, Kolhapur, India. Study duration was of 2 years (December 2019 to December 2021). Study approval was obtained from institutional ethical committee.

Inclusion criteria

1. The Pregnant women, Singleton pregnancy, period of gestation 37.1-42 weeks, Cephalic presentation, in spontaneous or induced labor, in first stage active phase of labor with cervical dilatation of ≤ 8 cms, willing to participate in present study

Exclusion criteria

1. Presence suspicion or confirmation of cephalopelvic disproportion
2. Cervical dilatation >8 cms
3. Premature labor <37 weeks
4. Malposition and mal presentations
5. Multiple pregnancy

Study was explained to patients in local language & written consent was taken for participation & study. A thorough history and clinical examinations was done. Demographic data such as age, parity, height, weight was recorded. Reason for induction and Bishop's score at the time of induction was recorded. The progress of labour was plotted on modified WHO partogram, fetal and maternal parameters were noted on a proforma along with it.

Labour protocols followed in our study were the following:

1. Plotting on partogram was started at cervical dilatation >4 cm; when plotting was started at cervical dilatation >4 , it was transferred over to alert line.
2. Augmentation of labour was done by amniotomy (a) or oxytocin(o) or both.(o+a)
3. Labour induction was done with T. Misoprostol 25 microgram orally 4 hourly and intracervical cerviprime gel in respectively indicated patients .
4. In case of PROM, diagnosis was established with

history, clinical examination . If the patient was already in labour, oxytocin augmentation based on uterine contractions was done and if not in labour, induction was done. Patients were given antibiotics if PROM >12 hr.

Dilatation of the cervix at a rate of 1cm/hr in primi & 1.5cm in multigravida beyond 4 cms dilatation (active phase of labour) is considered satisfactory

- When the partogram continued to be normal, no intervention was done
- When the partogram suggested that progress was slow, Amniotomy was performed
- If the dilatation curve crosses the alert line, the patient was immediately reassessed in view of CPD, if significant, the labor was terminated with c-section
- In protracted dilatation, no intervention was carried out but strictly monitored.

However, if the dilatation curve after a slow progress were to cease for at least two hours, a diagnosis of arrest of dilatation was made.

- In the absence of cephalopelvic disproportion, oxytocin drip was started to obtain ideal contractions and further progress watched .
- In cases of fetal distress in labor was diagnosed, immediately it was terminated by operative intervention.

For the purpose of analyzing the above data, partogram interpretation is put into 3 groups/zones depending on progress of cervical dilatation, namely Group A, Group B and Group C.

1. Group A - patients who delivered before the partogram touched the alert line, considered as normal progress of labour
2. Group B - patients who delivered when the partogram lies between the alert and the action line, considered abnormal and reassessment of progress of labor is done carefully and augmentation either by oxytocin or assisted delivery are done depending on the condition

Group C - patients who delivered after the action line was crossed immediate intervention and termination of pregnancy by caesarean section is considered to avoid fetal and maternal complications leading to severe morbidity and mortality.

Fetal outcome such as APGAR scores at 1 minute and 5 minutes, passage of meconium and NICU admission were recorded. The data was analyzed with SPSS version 23. Statistically significant differences were evaluated using t- test & Chi square test. P value of <0.05 was considered as statistically significant.

RESULTS

In present study, among 100 pregnant women, majority belongs to the age group of 22 to 25 years (49%), were primigravida (78%), had 39 to 40 weeks of gestational age (40%), delivered spontaneously (53%). Out of 47 participants required induction, combination of ARM (Artificial rupture of membrane) and oxytocin (63 %) was

common followed by only ARM (28%) and only oxytocin (8%). Majority delivered vaginally (78%), rest required Lower Segment Caesarean Section (LSCS) (22%).

Table 1: General characteristics

Characteristics	No. of patients	Percentage
Age groups (in years)		
18 – 21	32	32%
22 – 25	49	49%
26 – 29	11	11%
>30	8	8%
Gravida status		
Primigravida	78	78%
Multigravida	22	22%
Gestational age (in weeks)		
37-38	34	34%
38 – 39	19	19%
39-40	40	40%
40-41	7	7%
Onset of labor		
Spontaneous	53	53%
Induced (indications Prolonged pregnancy, PROM and Prolonged latent phase)	47	47%
Augmentation		
No augmentation done	1	1%
Augmentation done	99	99%
ARM	28	28%
Oxytocin	8	8%
ARM + Oxytocin	63	63%
Mode of delivery		
Normal vaginal delivery	78	78%
LSCS	22	22%

9 Babies had Apgar score <7, while 15 (15%) babies had meconium-stained liquor & 13 babies needed NICU admission. 36 (36%) babies had weights ≤ 2.5 Kg. 44% had baby weights from 2.6-3 kg and 28% babies had weight of 2.01-2.5 kg.

Table 2: Neonatal outcome

Neonatal outcome	No. of babies	Percentage
Outcome		
APGAR score < 7 at birth	09	9 %
Meconium aspiration	15 (13 - LSCS, 2 - vaginal delivery)	15 %
NICU admissions	13 (8 - LSCS, 5 - vaginal delivery)	13 %
Birth weight		
1.50 – 2.00kg	8	8%
2.10- 2.50kg	28	28%
2.60-3.00kg	44	44%
3.10-3.50kg	19	19%
3.60- 4.00kg	1	1%

Mean period of gestation in weeks in the normal delivery group was 38.86 ± 1.13 weeks as compared to LSCS group 39.41 ± 1.05 weeks, difference was statistically significant (p 0.04). The duration of second stage in the group of normal delivery was 27.82 ± 14.83 minutes, while participants among LSCS group was 86.67 ± 25.17 minutes, difference was statistically highly significant (P=<0.0001). Total number of participants with NICU admission needed were 5 and 8 among normal delivery and LSCS group, difference was statistically highly significant (P=<0.0001).

Table No. 3: Comparison according to mode of delivery

Parameters	Normal Delivery (n=78)	LSCS (n=22)	P Value
Mean age (in years)	23.46 ± 3.90	23.23 ± 4.42	0.823
Mean period of gestation (in weeks)	38.86 ± 1.13	39.41 ± 1.05	0.040
Augmentation	78	21	0.060

Mean duration of first stage (hrs.)	4.05 ± 1.74	3.80 ± 2.39	0.757
Mean duration of second stage (min)	27.82 ± 14.83	86.67 ± 25.17	<0.0001
NICU admission	05	08	<0.0001
Birth weight in kgs	2.76 ± 0.42	2.67 ± 0.43	0.373

It was noted that gestation age in spontaneous labor (38.52±1.08 weeks) was significantly lower than induced labor (39.38±1.02 weeks) (P=0.0001). Also, patient crossing alert line are significantly more in the induced group (P=0.047).

Table 4: Comparison between spontaneous and induced labors

Parameters	Spontaneous (n=53)	Induced (n=47)	P- value
Mean age in years	23.15±3.09	23.7±4.84	0.506
Mean gestation in weeks	38.52±1.08	39.38±1.02	<0.0001
Augmentation required	53	46	0.288
Duration of 1 st stage in hrs.	3.76±1.79	4.47±1.7	0.070
Duration of 2 nd stage in min	57.83±15.48	32.06±22.13	0.343
Patients crossing alert line	08	15	0.047
LSCS	08	14	0.078
Birth weight	2.74±0.407	2.74±0.440	0.983
NICU admission	07	06	0.948

No statistically significant difference was seen in the parameters like age of patient, mean gestational age, number of LSCS, NICU admission, and crossing alert line in augmentation required group and no requirement group.

Table 5: Comparison between requirements of augmentation

Parameters	Augmentation done (n=99)	No augmentation Done (n=01)	P-value
Mean age (in years)	23.35±3.98	29	0.161
Mean gestational age (in weeks)	38.89±1.13	40	0.333
LSCS	21	01	0.060
NICU admission	13	00	0.699
Crossed alert line	22	01	0.067
Birth Weight (kgs)	2.74±0.423	27.00	0.929

Majority belonged to group A (77% - reported at left to alert line), followed by group B (19% - found between alert and action line) & group C (4% - reported to be right of the action line). The participants with LSCS which were left to alert line was 15 and 03 participants were between alert and action line, while 04 participants were right to action line and the relationship was highly significant (P=0.001). Also, duration of first stage in minutes in the group of left to alert line was 3.42±2.70 hours and to the right of the action line was 4.0±2.71 hours, while participants among alert and action line had mean duration of second stage of labor was 6.29±1.21 hours and the relationship was significant (P=<0.0001). Also, duration of second stage in minutes in the group of left to alert line was 26.05±13.70 minutes and to the right of the action line was 86.67±25.17minutes, while participants among alert and action line had mean duration of second stage of labor was 34.69 ± 17.37 minutes and the relationship was significant (P=<0.0001).

Table 6 : Comparison between groups according to alert and action line

Parameters	Group I (n=77)	Group II (n=19)	Group III (n=4)	P Value
Mean age (in years)	23.17±4.01	24.63±4.13	22.25±2.22	0.306
Mean period of gestation (in weeks)	38.92±1.13	39.05±1.18	39.75±0.5	0.345
Augmentation	77	18	4	0.119
Mean duration of first stage (hrs.)	3.42±2.70	6.29±1.21	4.0±2.71	<0.0001
Mean duration of second stage (min)	26.05±13.70	34.69±17.37	86.67±25.17	<0.0001
LSCS	15	3	4	0.001
NICU admission	9	2	2	0.082
Birth weight in kgs	2.73±0.41	2.81±0.50	2.60±0.14	0.588

DISCUSSION

Obstetric care is an important way of improving the health indices of nation. Labour can be monitored effectively by using an easily accessible and inexpensive tool partograph. Benefits of it includes

1. Unlike other interventions in maternal health, use of the partograph does not require expensive technology, which may malfunction.
2. A picture is worth a thousand words. Rather than reviewing of a detailed hand written case

notes, a partograph review (if well recorded) provides rapid, comprehensive information about progress in labor .

3. Midwives find the partograph to have practical benefits in terms of ease of use, time resourcefulness, continuity of care and educational assistance, and these positive aspects may contribute to improving maternal and fetal outcomes.
4. Help to increase the quality and regularity of fetal and maternal monitoring of wellbeing during labour.

Induction of labour is indicated when the benefits to either to the mother or the fetus outweigh than those of continuing the pregnancy. More common indications include membrane rupture without labor, hypertension, post term pregnancy, and various maternal medical conditions such as chronic hypertension and diabetes.⁸ Women whose labor is induced have an increased incidence of chorioamnionitis and cesarean delivery compared with those in spontaneous labor. Several factors increases the success rate of labour induction and include multiparity, BMI <30, favorable cervix and birth weight <3500 gm.⁹ Though in our study we didn't find any significant difference between the spontaneous and induced group of patients, however the mean gestational age was significantly higher in induced group than the nulliparas who had spontaneous onset of labour. This can be explained with fact that there were considerable number of patients in induction group with prolonged pregnancy in whom labour was induced. And also, the patients in induced group was found significantly crossing alert line more indicating taking more time to progress in induced category than the spontaneous category. Yadav K et al.,¹⁰ noted that in spontaneous group mean duration of labour was less than induced group and most of the patient delivered vaginally. In induced group rate of caesarean was higher and requirement of oxytocin for labour augmentation was also more than spontaneous group. Maternal complications were also found more in induced group than spontaneous group whereas neonatal outcome was similar in both the groups. We observed in our study that induced labour can be a safe procedure among nulliparous women if labour is partographically monitored by WHO modified partograph. Risk factors intrinsic to the patient, rather than labour induction itself, are the cause of excess cesarean deliveries in women with prolonged pregnancies.⁹ We found the mean cervical dilatation rate as 1.29+/-0.39 cm/hr in our study. The mean rate of cervical dilatation in lowest 10th centile of study population was 0.99 + 0.12 cm/hr. The standard partogram's alert line, defined as a rate of cervical dilatation of 1 cm/h, represents the mean rate of cervical dilatation of the slowest 10% of primigravid spontaneous labour though it would be more appropriate to select rate of cervical dilatation in lowest 10th centile in a given population of nulliparas. In our study population rate of cervical dilatation in lowest 10th centile is around 1cm/hr (0.99cm/hr) compared to study

by L.J. van Bogaert¹¹, found it as 0.86cm/hr or 1.2 times slower than standard alert line and can be used to construct alert line similar to standard partogram's alert line. Augmentation refers to stimulation of spontaneous contraction that are considered inadequate because of failed cervical dilatation and fetal descent. In present study, P- value was not found significant for mean gestational age, duration of first and second stages of labour, for caesarean section and crossing the alert line on partogram and other parameters like age, induction of labour ,forceps delivery or NICU transfers of babies were not found related to augmentation of labour.

Pregnancy lasting beyond 40 weeks is a known complication of normal delivery. Studies have found incidence between 2-14%. Post-dated pregnancy carries specific hazards to both mother and fetus. While mothers are faced with problems like increased incidences of induced labour, instrumental delivery and LSCS with associated morbidities, Anand and his associates concluded that Women with uncomplicated postdated pregnancies with good bishop score should be allowed spontaneous labour and those with poor bishop should be offered induction of labour, while women with any complicating factors LSCS should be considered.¹² Kori and his associates concluded that pregnancies beyond 40 weeks require early detection, effective fetal monitoring and proper planning of labour. In pregnancies beyond 40 weeks, decision of induction should be taken cautiously as early induction leads to failure of induction and increased rates of lower (uterine) segment Caesarean section (LSCS), while delayed induction leads to increased fetal complications.¹³ Matta P et al.,¹⁴ noted that prolonged second stage of labour increases maternal morbidity but not neonatal morbidity, similar findings were noted in our study. The duration of second stage of labour increased in participants crossing the alert line and action line was significant statistically(p-value = 0.0001) compared to those who remaining on the left of alert line . This statistical significance indicating prolonged second stage of labour (PSSL)and it causing increased operative interventions and maternal morbidity.¹⁴ In study by Kuntal N et al.,¹⁵ CS rate was 27.1%. Although primary caesarean section in multipara constitutes only a small percentage of total deliveries and caesarean, they are associated with high maternal and perinatal morbidity.¹⁶ As expected, duration of labour will be significantly (p-value<0.0001) longer in patients crossing the alert line when compared to the other group who remains left of alert line . In our study ,the duration of first stage of labour nearly doubled, as the labour slowed down crossing the alert line, early identification of slow labour and initiation of intervention in form of augmentation to be done to avoid the abnormal progress of labour. ¹⁷ Sethi and his associates concluded that labour can be managed without the latent phase being plotted on the partograph. The interventions were higher when the latent phase was included, with increased number of labour crossing the alert and action lines, increased number of

augmentations and larger number of caesarean sections. Our study favours the use of the WHO modified partograph, which should become routine practice in monitoring labour for better maternal and perinatal outcome.¹⁷

CONCLUSION

Modified WHO partogram is no different from other types of WHO partogram for monitoring the progress of labour, apparently it is easier to plot compared to other WHO partogram versions. It is more user friendly and can be easily taught to skilled birth attendant. with the removal of one component (latent phase) from earlier versions of partogram. Our study favours the use of the WHO modified partograph, which should become routine practice in monitoring labour for better maternal and perinatal outcome. ⁽³¹⁾ We recommend that there should be regular in-house-training and re-training of the maternal health care providers on the use of partograph in labour management .

CONFLICT OF INTEREST

None to declare

SOURCE OF FUNDING

Nil

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