International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Ahmed B et al. Int J Reprod Contracept Obstet Gynecol. 2017 Nov;6(11):4928-4933
www.ijrcog.org

pISSN 2320-1770 | eISSN 2320-1789

DOI: http://dx.doi.org/10.18203/2320-1770.ijrcog20175002

Original Research Article

Partograph versus no partograph: effect on labour progress and delivery outcome: a comparative study

Benazir Ahmed*, Meena Jain, Hema Bharwani

Department of Obstetrics and Gynaecology, JLN Hospital and Research centre, Bhilai, Chattisgarh, India

Received: 17 August 2017
Accepted: 16 September 2017

***Correspondence:**
Dr. Benazir Ahmed,
E-mail: ahmedbenazir1@gmail.com

ABSTRACT

Background: Abnormal labour which includes prolonged labour and obstructed labour remain major causes of maternal morbidity. The major reason for neonatal mortality, birth asphyxia and subsequent morbidity is essentially the repercussion which occurs when a complicated labour is not intervened at the right time. A Partograph provides a graphic overview of the progress of labour and records information about maternal and fetal condition during labour. It is considered to be a very effective tool to monitor labour progress and prevent prolonged and obstructed labour.
Methods: This prospective randomised comparative study was conducted in the Department of Obstetrics and Gynaecology, JLN Hospital and RC, Bhilai, Chattisgarh, from January 2015 to June 2016. Pregnant women were randomly assigned to two groups, of 200 each, after satisfying the inclusion and exclusion criteria. Women assigned to Group 1 had their active labour modified using modified WHO partograph whereas those assigned to Group 2 were not monitored using the partograph.
Results: Use of Partograph (group 1) significantly reduced the duration of active phase of labour ($p < 0.0001$), duration of second stage ($p < 0.0001$) and thus the total duration of labour (active phase plus second stage) ($p < 0.0001$). Requirement of augmentation was also significantly reduced ($p < 0.05$). Group 1 also had significantly more spontaneous vaginal deliveries ($p < 0.01$) with lesser requirement of operative interventions like LSCS or instrumental deliveries like forceps. Use of partograph also significantly improved neonatal outcome with significantly lesser newborns with Apgar <7 ($p < 0.05$). However, there was no significant difference between the two groups with regard to NICU admissions ($p > 0.05$).
Conclusions: The use of Partograph, when compared to no Partograph plotting in active labour, is associated with better monitoring of labour progress as well as delivery outcome in the form of a healthy mother and a healthy child.

Keywords: Active phase, Apgar score, Partograph, Second stage

INTRODUCTION

Abnormal labour which includes prolonged labour and obstructed labour remain major causes of maternal morbidity.

The consequence of mismanaged labour can manifest in the form of postpartum haemorrhage, infection, obstetric fistula, fetal distress, fetal injury or death.[1] In total, obstructed labour and puerperal sepsis contribute up to 25% of maternal deaths in India which is directly related to poor attention given to monitoring of the progress of labour and improper management of prolonged labour.[2] The major reason for neonatal mortality, birth asphyxia and subsequent morbidity is essentially the repercussion which occurs when a complicated labour is not intervened at the right time. A Partograph is a pre-printed single page form on which labour observations are recorded. It provides a graphic overview of the progress

of labour and records information about maternal and fetal condition during labour.

World Health Organization has designated management of labour with the Partograph as one of the essential elements of obstetric care at the first referral level.[3] Since its first inception by Friedman in 1994, the Partograph has undergone various modifications and improvement which has resulted in the development of the latest version, the simplified partograph.[3]

The objectives of the study were to evaluate the effect of use of Partograph on progress of labour and on delivery outcome.

METHODS

It was a hospital based prospective, randomized, comparative study conducted at JLN Hospital and Research Centre, Bhilai, Chattisgarh from January 2015 to June 2016.

Using the Cochran formula for sample size:

$N= Z^2 \times p (1-p) /e^2$

Where,

N = sample size in each group,
p = proportion of reduction in interventions to increase delivery rhythm (as a measure of effectiveness of Partograph in management of labour)
e = level of precision.

Using, Z = 1.96 at 95% confidence interval,
p = 11% i.e. 0.11 (in accordance with previous study)[4], and
e = 5% i.e.0.05,

N comes to be 150.

So, my sample size was 200 patients each in group 1 and group 2.

Patients admitted to the Department of Obstetrics and Gynecology, JLN Hospital and Research Centre, for their delivery were enrolled into the study after taking their consent, provided they fulfilled the inclusion criteria.

Inclusion criteria

- Any pregnant woman, irrespective of their gravida status, and
- Age: 18 years and above
- Gestational age: 37- 42 weeks
- Single viable pregnancy
- Cephalic presentation
- Labour: spontaneous/induced
- Cervical dilatation 4 cm or beyond.

Exclusion criteria

- Non- cephalic presentation
- Any uterine scar
- Any further contraindication for vaginal delivery, such as

a. Absolute cephalopelvic disproportion
b. Transverse lie
c. Placenta previa
d. Brow presentation
e. Cord prolapse.

Patients who satisfied the inclusion criteria and had given their consent to be included into the study were randomly allotted either into,

- Group 1: Patients who were to be monitored in the active phase of labour using modified WHO Partograph.
- Group 2: Patients whose active labour was not monitored using modified WHO Partograph.

Patients were allotted serial numbers as they were enrolled into the study and then those with odd serial numbers like 1,3,5, etc. were included in group 1 and those with even numbers like 2,4,6 etc. were included in group 2.

All the patients were routinely examined and detailed history was taken as per the prepared proforma. All investigations done during her previous antenatal checkups were noted down and important investigations, if recent not available, were repeated, as follows:

- Complete blood count
- ABO/Rh grouping
- HIV/ HBsAg /VDRL (if not already done)
- Obstetric ultrasonography for fetal wellbeing, if required.

Patients fulfilling the inclusion criteria, after being admitted were questioned and thoroughly examined with pre-designed pre-tested proforma.

General, systemic and obstetric examinations were done.

- Per-abdominal examination: height of uterus, presentation, engagement and fetal heart rate were noted.
- Per-vaginal examination: presentation, position, engagement, cervical dilatation,

Effacement, station, status of membranes, color of liquor (if membrane were absent), adequacy of pelvis (r/o absolute cepahlopelvic disproportion), was done.

When in active labour, the details of labour and other relevant details were recorded on the modified WHO Partograph in group 1.

Active phase of group 2 patients was monitored arbitrarily without recording their findings on Partograph.

Labour progress was assessed by:

- Duration of active phase,
- Duration second stage
- Total duration of labour
- Need for augmentation (ARM and oxytocin).

Delivery outcome was assessed by:

- Mode of termination and intervention required
- Apgar score at birth
- NICU admissions.

Statistical analysis

After primary data collection, a master chart was prepared with the help of Microsoft excel sheet and data entered in it was analyzed by using MS excel and SPSS (Statistical Package for the Social Sciences) version 17. Non-parametric (discrete data) were compared using chi-square test while parametric data were compared by unpaired t-test. Mean, standard deviation and percentage were calculated for parametric data. A p-value of <0.05 was considered to be statistically significant.

RESULTS

The variables in the two groups were tabulated and compared.

Mean duration of active phase in group 1 was 3.41±1.389 hrs and mean duration in group 2 was 5.17±1.679 hours.

Table 1: Comparison of group 1 and group 2 based on duration of active phase.

Duration of active phase (hours)	Group 1 (n=162)	Group 2 (n=189)
0.3-1.3	8	0
1.31-2.3	43	2
2.31-3.3	47	27
3.31-4.3	38	46
4.31-5.3	11	46
5.31-6.3	11	25
6.31-7.3	3	27
7.31-8.3	1	11
8.31-9.3	0	2
9.31-10.3	0	2
10.31-11.3	0	0
11.31-12.3	0	1

Chi square value = 109.465, d.f. = 7, p value = <0.0001 (Highly significant)

Patients who presented with cervical dilatation >4 cm and those who were taken for caesarean section in the first stage were excluded from the calculation of mean. Therefore, out of 200 patients in group 1, 162 were included for calculation of their mean active phase duration. Similarly, out of 200 patients of group 2, 189 were included in the calculation of the mean duration of active phase of group 2. Average rate of cervical dilatation in group 1 was 1.76 cm/hour and in group 2 patients it was 1.16 cm/hour.

Table 2: Duration of second stage.

Time interval (minutes)	Group 1 (n=191)	Group 2 (n=178)
0-20	54	2
21-40	85	59
41-60	42	81
61-80	3	13
81-100	4	11
101-120	2	12
121-140	1	0

Chi square value = 75.34, d.f. = 6, p value = <0.0001 (Highly significant)

Since p value is <0.0001, hence we conclude that there is a significant difference in the active phase duration between the group which is monitored by Partograph (group 1) and the group which has not been monitored by Partograph (group 2).

Table 1 shows the observations related to the patient based on the duration of active phase of labour in group 1 and group 2. The trend on the table clearly depicts that in group 1 (where Partograph was used) most patients had shorter duration of active phase as compared to group 2 (in which Partograph was not used). It can be seen from the table that group 2 had active phase reaching longer time duration, i.e., even up to >12 hours.

The mean duration of second stage in group 1 was 34.78±20.59 min and in group 2 it was 56.46±23.94 min. The patients who were taken for cesarean section in the first stage or second stage were excluded from calculation of the mean duration of second stage. Therefore, 191 out of 200 patients from group 1 and 178 out of 200 patients from group 2 were included in calculation of their respective mean duration of second stage.

Table 3: Total duration of labour (active phase duration + second stage duration).

Time interval	Group 1 (n=159)	Group 2 (n=176)
1-2.3 hours	26	0
2.31-4 hours	61	17
4.01-5.30 hours	49	61
5.31-7 hours	17	55
7.01-8.3 hours	6	32
8.31-10 hours	0	9
10.01-11.30 hours	0	2

Chi square value = 100.37, d.f. = 6, p value = <0.0001 (Highly significant).

We can see from the Table 2, 85 patients (44.5%) had second stage between 21-40 min in group 1 and 81 patients (45.5%) in group 2 had second stage duration between 41-60 minutes. Since the p value is <0.0001, we conclude that the difference between the two groups with respect to duration of second stage was statistically significant.

Mean total duration was 3.87±1.46 hours in group 1 and 5.91±1.60 hours in group 2. Total duration was calculated for all those patients for whom both duration of first stage and second stage were determined. Thus, 159 out of 200 patients from group 1 and 176 out of 200 patients from group 2 were used to calculate their respective mean of total duration of labour.

Total duration of labour was the sum of active phase duration and duration of second stage, i.e., the total time taken from beginning of active phase to delivery of the baby.

Total duration was calculated for all those patients for whom both duration of first stage and second stage were determined. Since p value is <0.0001, we conclude that the difference between the two groups with respect to total duration of labour is statistically significant. 61 patients (38.36%) in group 1 had total duration between 2.31-4 hours whereas 61 patients (34.65%) in group 2 had their total duration between 4.01-5.30 hours.

Table 4: Comparison between group 1 and group 2 based on requirement of augmentation.

	Group 1 (n=200)	Group 2 (n=200)
No augmentation	133 (66.5%)	112 (56%)
Augmented	67 (33.5%)	88 (44%)
ARM	15 (22.4%)	17 (19.3%)
Oxytocin	20 (29.8%)	27 (30.7%)
ARM + oxytocin	32 (47.7%)	44 (50%)

Chi square value = 4.645, d.f. = 1, p value = <0.05 (Significant)

In group 1, 33.5% patients required augmentation with either ARM or oxytocin or both whereas 66.5% did not require any form of augmentation. In group 2, 44% patients required augmentation whereas 56% did not require augmentation. Since the p value <0.05, the difference in the groups with reference to need for augmentation was statistically significant.

Among the augmented group, 22.4% patients in group 1 and 19.3% in group 2 were augmented by ARM, 29.8% patients in group 1 and 30.7% in group 2 required oxytocin augmentation.

Remaining 47.7% in group 1 and 50% patients in group 2 required a combination of ARM and oxytocin. In the present study, there were 91% normal vaginal deliveries in group 1 compared to 81.5% in group 2. There was also a reduction of need for intervention when Partograph was used. Group 1 had 8.5% patients requiring operative interventions whereas it was 18.5% in group 2.

Table 5: Comparison of group 1 and group 2 based on mode of delivery.

	Group 1 (n=200)	Group 2 (n=200)
Normal vaginal delivery	182 (91%)	163 (81.5%)
Operative intervention	17 (8.5%)	37 (18.5%)
LSCS	11 (5.5%)	21 (10.5%)
Forceps	6 (3%)	16 (8%)
Face to pubis	1 (0.5%)	-

Chi square value = 9.454, d.f. = 2, p value = <0.01 (Highly significant)

Out of the total 200 patients, 5.5% patients in group 1 and 10.5% in group 2 required LSCS whereas 3% patients in group 1 and 8% patients in group 2 required forceps delivery. There was one face to pubis delivery in group 1. The p value is <0.01, so the difference among the two groups with respect to mode of delivery was statistically significant.

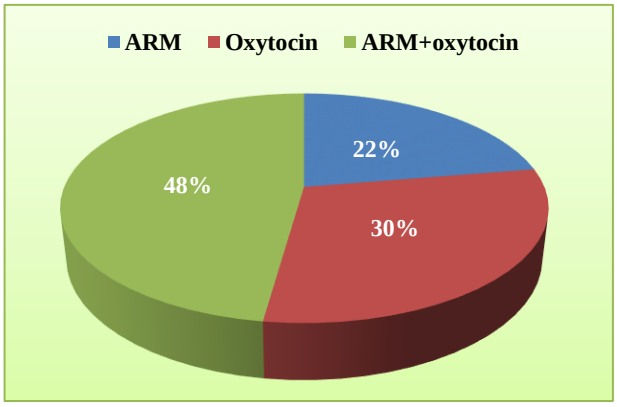

Figure 1: Distribution of patients in group 1 and based on methods of augmentation.

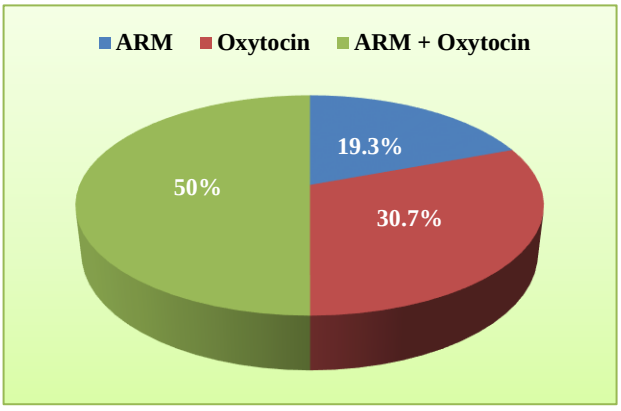

Figure 2: Distribution of patients in group 2 and based on methods of augmentation.

In the study, the new-borns with Apgar score ≥7 were included in one group and those with Apgar <7 in another group.

As it can be seen from Table 6, 6.5% new-borns of group 1 had Apgar score <7 compared to 13% in group 2. Since the p value <0.05, the difference between the two groups with respect to Apgar score at birth was statistically significant.

Table 6: Comparison of APGAR score at birth of new-borns of group 1 and group 2 patients.

	Group 1 (n=200)	Group 2 (n=200)
Apgar ≥7 at birth	187 (93.5%)	174 (87%)
Apgar <7 at birth	13 (6.5%)	26 (13%)

Chi square value = 4.801, d.f. =1, p value = <0.05 (Significant)

Out of 200 new-borns in group 1, 9.5% required NICU admissions. Out of 200 new-borns in group 2, 20% required NICU admissions. Out 19 new-borns requiring NICU admission in group 1, 6 new-borns (31.6%) had Apgar score <7 and remaining 13 new-borns (68.4%) had Apgar score ≥7. Out of 40 new-borns in group 2 who required NICU admission, 18 new-borns (45%) had Apgar score <7, whereas 22 new-borns (55%) had Apgar score ≥7. There was no statistical difference (p value >0.05) found among the two groups with respect to NICU admission.

Table 7: Comparison of NICU admissions required for neonates of group 1 and group 2 patients.

	Group 1 (n=200)	Group 2 (n=200)
For Apgar ≥7	13 (68.4%)	22 (55%)
For Apgar <7	6 (31.6%)	18 (45%)
Total	19 (9.5%)	40 (20%)

Chi square value = 0.962, d.f. = 1, p value >0.05

DISCUSSION

In the present study, mean active phase duration in group 1 was 3.41±1.39 hours and in group 2 it was 5.17±1.68 hours. Mean duration of first stage of labour (from 4 cm dilatation to full dilatation) was found to be 3.41±1.4 hours in the study conducted by Ajay KS et al.[5] Rutuja et al obtained the mean active phase duration in patients followed with Partograph to be 3.13 hours which was comparable to the present study.[6]

In the present study, mean duration of second stage in group 1 was 34.78±20.59 minutes and in group 2 was 56.46±23.94 minutes. Ajay KS et al reported the mean duration of 2nd stage a labour in his study using Partograph to be 33.64±23.85 minutes.[5] Rutuja K et al found the duration of second stage with use of Partograph to be 37.04 minutes which was comparable to the present study.[6] Total duration of labour in the present study was 3.87±1.46 hours in group 1 and 5.91±1.60 hours in group 2 which was comparable to study conducted by Pinky R et al using the Partograph to be 3.29±0.605 hours.[7] Total duration of labour was 3.96±1.5 hour according to study conducted by Ajay KS et al.[5]

In the present study, the requirement of augmentation with the use of Partograph was 33.5% in group 1 compared to 44% in group 2 and the difference was statistically significant (p <0.05). In a WHO multicenter trial, there was reduction in the need for augmentation which from 20.7% before the introduction of Partograph to 9.1% after introduction of Partograph.[8] The difference observed from the previous study may be due to the labour protocol followed in our hospital which might differ from the labour protocol followed in the WHO study.

In the present study, there were 91% normal vaginal deliveries in group 1 and 81.5% in group 2. In study conducted by Javed I et al, there were 92% normal vaginal deliveries after introduction of Partograph whereas 89.2% before introduction of Partograph which was comparable to the present study.[9] Study by Divya S et al reported 83.8% spontaneous vaginal deliveries in patients followed by Partograph (cases) and 69.4% normal vaginal deliveries in patients not monitored by Partograph (controls).[10]

In the present study, 5.5% patients in group 1 and 10.5% patients in group 2 had to undergo cesarean section. In the study conducted by Javed I et al, there were 12.8% cesarean sections in primigravidae before introduction of Partograph which reduced to 6.4% after introduction of Partograph.[9] In study conducted by Divya S et al, cases (using Partograph) had 18% cesarean sections and 8% in controls (without Partograph).[10] Manjulatha B et al reported a 4.5% cesarean section rate in patients monitored with partogram and 20% cesarean sections amongst those not monitored using partogram.[11] In a WHO multicenter trial in Southeast Asia involving 35,484 women, introduction of the partogram reduced emergency caesarean sections from 9.9% to 8.3%.[8]

In the present study, group 1 had 3% and group 2 had 8% of instrumental deliveries all of which were forceps deliveries. Javed I et al reported the incidence of instrumental vaginal deliveries in primigravidae, before the introduction of Partograph to be 8.8% which reduced to 5.6% after introduction of Partograph.[9] These results were comparable with the present study. Pinky R et al, in her study comparing partogram vs no partogram, found out that there were 1% instrumental deliveries in first group and 3% in the second group.[7]

Overall, there was a statistically significant difference between the mode of deliveries of group 1 and group 2 in the present study. Javed et al and Divya S et al also found

significant difference between mode of deliveries among those followed with Partograph with those who were not.[9,10] In the present study, 6.5% newborns had Apgar score <7 at birth in group 1 compared to 13% in group 2. Ajay KS et al in his study demonstrated 6% of newborns with Apgar score <7 at birth which was comparable to the present study.[5] Pinky R et al demonstrated an Apgar score of <7 at birth in 2.4% of the newborns born to mother monitored using partogram.[7]

In the present study, there were 19 (9.5%) NICU admissions in group 1 compared to 40 (20%) in group 2. The present study was comparable to the study conducted by Surekha T et al who found a significant reduction in NICU admissions of control group not monitored by Partograph (17%) as compared to the cases (6%) who were monitored by modified WHO Partograph.[12] In study conducted by Ajay KS et al, there were 5.2% NICU admissions.[5]

CONCLUSION

The Partograph is a simple graphical representation of the major events in a woman in active labour and enables relevant fetal and maternal parameters to be viewed at a glance. Management of labour under Partographic guidance helps in reducing the active phase of labour, second stage of labour and hence the total duration of labour.

It also effective in reducing the need for augmentation and allows the labour to progress spontaneously without the need of unnecessary interventions. It provides a valuable guide as to when the labour is slowing down so that decision of intervention in the form of labour augmentation is taken.

Proper and correct interpretation of Partograph increases the number of normal vaginal deliveries by reducing the unnecessary interventions that would have been taken when Partograph is not used. It helps in assessing the progress of labour, maternal and fetal parameters and hence helps in deciding when an operative intervention, in form of cesarean section or instrumental delivery, is actually required so that we get a healthy mother and a healthy baby.

The neonatal condition, as assessed by Apgar score after the baby is born, is also better when the labour is monitored using Partograph. This is because the Partograph accurately denotes the condition of fetus as the labour is progressing and hence also helps in taking necessary steps to assure a healthy newborn. Therefore, the use of partograph should be included as an essential pre-requisite while conducting deliveries in all labour wards.

ACKNOWLEDGMENTS

Author would like to thank Dr. Meena Jain, Joint Director and HOD, Department of Obstetrics and Gynecology, JLNH and RC, Bhilai, Dr Hema Bharwani for their help during the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kushwah B, Singh AP, Singh S. The Partograph: An essential yet underutilized tool. J Evol Med Dental Sci. 2013;2(24):4373-9.
2. World Health Organization. The World Health Report 2005: Make every mother and child count. Geneva: World Health Organization; 2005.
3. Friedman EA. The graphic analysis of labour. Am J Obstet Gynecol. 1954; 68:1568-75.
4. de Azevedo AC, Gonçalves R, d'Andretta Tanaka AC. Use of the partogram in labor: Analysis of its application in different care models. Open J Obstet Gynecol. 2013;3:1-8.
5. Sharma AK, Yadav K, Narayan S, Narayan JP. Utility of alert and action lines on partograms in management of labour in primigravida for improving prenatal outcome. Ind J Applied Res. 2016;6(7);552-5.
6. Kolekar R, Gundalli SM, Kolekar A, Pai K. Role of partogram in nulliparas. Int J Sci Res. 2014;3(12):2539-44.
7. Rachhoya P, Barolia DK. Universal Acceptance of Partogram. Int J Adv Res. 2015;3(10):640-4.
8. World Health Organization. World Health Organization partograph in management of labour. World Health Organization Maternal Health and Safe Motherhood Programme. Lancet. 1994;343:1399-1404.
9. Javed I, Bhutta S, Shoaib T. Role of partogram in preventing prolonged labour. J Pak Med Association. 2007 Aug;57(8):408-11.
10. Sinha D, Shrivastava S, Shrivastava S. Management of labour in primigravida with modified WHO partograph. Sch J App Med Sci. 2016;4(9D):3457-61.
11. Manjulatha B, Prathibha TS. Role of partogram in early recognition of early recognition of cephalopelvic disproportion and prevention of obstructed labour. National J Res Comm Med. 2015;4(2):207-215.
12. Tayade S, Jadhao P. The impact of use of WHO partograph on maternal and perinatal outcome. Int J Biomed Adv Res. 2012;03(04):256-262.

Cite this article as: Ahmed B, Jain M, Bharwani H. Partograph versus no partograph: effect on labour progress and delivery outcome: a comparative study. Int J Reprod Contracept Obstet Gynecol 2017;6:4928-33.