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## Original Research Article

# To study the clinical utility of WHO modified and paperless partograph in the management of labour and its outcome

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## ABSTRACT

**Background:** Early detection of abnormal progress of labour and prevention of prolonged labour significantly improves pregnancy outcomes. Partograph is a simple and important tool which can provide a continuous pictorial overview of labour on a single sheet of paper and is essential to monitor labour.

**Aims and Objectives:** (1) To study the progress of labour using WHO modified partograph in terms of alert line and action line and using paperless partograph in terms of alert and action estimated time of delivery and detect any deviation from normal progress of labour. (2) To evaluate the duration of labour, mode of delivery and perinatal outcome in both the groups.

**Materials and Methods:** It was a prospective observational study which was conducted over a period of 18 months on 200 antenatal patients admitted to the Department of Obstetrics and Gynaecology at Christian Medical College and Hospital, Ludhiana. Antenatal patients with singleton term pregnancy with cephalic presentation in active phase of labour were included in the study. The WHO modified partograph was plotted for 100 cases (Group I) and the paperless partograph was recorded for the other group of 100 patients (Group II) and their outcomes were compared. The p value <0.05 was considered to be significant.

**Results:** In our study we noted that the findings were similar in the WHO modified partograph group and the paperless partograph group in terms of duration of labour, progress of labour, mode of delivery and neonatal outcomes with no statistically significant difference between both the groups.

**Conclusion:** Our study concluded that the paperless partograph is as good as the WHO modified partograph in predicting the labour outcomes and identifying labour abnormalities. The paperless partograph does not need graphical representation and therefore can be adopted as an alternative to the WHO modified partograph in busy labour room settings.

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## 1. Introduction

Labour is the most crucial stage in a women's life impacting both her physical and mental wellbeing. Labour management involves dealing with two lives – mother and the baby. For most patients labour progresses normally, however complications can arise at any time during the entire course and it leads onto a distressing situation if left

unidentified.

It has been seen that more than one third of maternal deaths, half of stillbirths and a quarter of neonatal deaths result from complications occurring during childbirth.<sup>1</sup> In low-resourced countries like India, prolonged labour and delay in decision-making are the most important causes of adverse obstetric outcomes. Owing to the low resources, it is usually not possible to individually monitor each patient, therefore, a simple obstetric tool in the form of a partograph was introduced for early detection of abnormal progress of

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labour and prevention of prolonged labour.<sup>2,3</sup>

It has been truly said that a picture is worth a thousand words. Similarly, a partograph is the pictorial representation of all the essential key observations made during labour and during delivery on a pre-printed single sheet of paper. It acts as an “early warning system” which aids in timely decision-making by detecting any deviation from the normal labour progression.

Partograph has evolved over the years as the understanding of labour progression advanced with the aim to retain its effectiveness and at the same time make it more user-friendly. The WHO in 2000 introduced the WHO modified partograph and recommended that it should be used universally at all levels of maternity care for labour management. But it was realised that the use of partograph in the real world is very limited, because of several factors - such as the lack of awareness among health care providers, difficult learning curve, time consumption, high patient load and low availability of partographs to name a few.<sup>4,5</sup>

To overcome these drawbacks, Dr. Alope Debdas introduced the paperless partograph which is a very simple, low skill and graph less method and is based on calculating the expected time of delivery (ETD)<sup>6</sup> It is merely a 2-step mental calculation method which requires basic addition and knowledge to read the clock. He proposed that the WHO modified partograph is elaborate and complicated for routine use in settings with high patient load.

Our study intended on plotting the WHO modified partograph and Paperless partograph for women in labour. The present study was conducted with the aim to evaluate and compare the usefulness of both the partographs in detecting abnormal labour and to compare their outcomes.

## 2. Materials and Methods

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Christian Medical College and Hospital, Ludhiana, a tertiary care centre in North India over a period of 18 months from 15<sup>th</sup> November 2020 to 15<sup>th</sup> May 2022. Ethical clearance was taken from the institutional ethical committee.

### 2.1. Inclusion criteria

1. All antenatal patients with singleton pregnancy at term gestation with cephalic presentation admitted for delivery.
2. Patient in established active phase of labour (cervical dilatation at the time of inclusion should be 4cm or more to upto 8cms).

### 2.2. Exclusion criteria

1. Multiple pregnancy
2. Non vertex presentation
3. Macrosomia

4. Short statured (height  $\leq 145$  cms)
5. Previous caesarean section or any uterine surgery
6. Preterm and post term labour
7. Acute antenatal complications such as Antepartum haemorrhage, Preeclampsia with severe features and eclampsia
8. Intrauterine fetal death

### 2.3. Data collection

Total of 200 antenatal patients with singleton term pregnancies with vertex presentation were included in the study after obtaining an informed consent. Patients included in the study were divided into two groups. Convenient sampling was used to allocate the patients into 2 groups (every alternate patient included into different group):

1. Group (I) – 100 patients for which WHO modified partograph was plotted.
2. Group (II) – 100 patients for which paperless partograph was plotted.

The respective partograph was plotted for patients in each group in the active phase of labour (i.e. cervical dilatation of  $\geq 4$ cms). If a patient was admitted in the latent phase of labour, plotting of the partograph was started once patient enters the active phase.

Plotting of the WHO modified partograph (Group I): Plotting of the WHO modified partograph starts with  $\geq 4$  cm of cervical dilatation. Progress of labour was recorded in terms of pre-printed ‘alert line’ and ‘action line’.

Plotting of the paperless partograph (Group II) : In this group, the estimated time of delivery (ETD) was calculated i.e. Alert ETD and Action ETD, based on Friedman’s rule that the cervix dilates @1cm/hr when a woman is in active labour. For this, we added six hours to the time at which the woman was 4cm dilated to find the alert ETD (represents the time when patient is expected to be 10cms dilated). And we added four hours to the alert ETD to get the action ETD.<sup>7</sup> Both these time values were written on the patient’s case management sheet, the action ETD was circled in red. If the patient had not yet delivered even till the action ETD, then diagnosis of abnormal labour was made and an intervention was planned as required – operative vaginal delivery or caesarean section.

In both the groups, Labour was monitored until delivery and the outcome was reported at the bottom of the partograph on the case sheet.

### 2.4. Statistical analysis

It was performed using SPSS version 26.0. Chi square test was used to find the association between the categorical variables. One Way ANOVA or Kruskal Wallis test was used to associate the continuous variables. The independent T test was used to test the association between the type of

partograph and other parameters. The P value  $<0.05$  was considered to be statistically significant.

### 3. Results

This prospective observational study was conducted on 200 antenatal patients which were divided into 2 groups : Group I (n=100) - WHO modified partograph was used ; Group II (n=100)- Paperless partograph was used.

Table 1 compares the demographic parameters of patients in both the groups including mean age of patients, parity, mean gestational age and antenatal booking status. It was observed that all the demographic parameters were comparable in both the groups.

As seen in Table 2, Majority of the patients in both the groups presented in spontaneous labour. Also, irrespective of the onset of labour, there was no statistical difference in the need for augmentation with oxytocin among both the groups. Time taken till delivery in WHO group was shorter than paperless partograph group, however the difference was not significant (p value 0.507). It was also seen that patients who delivered before reaching the alert line, between the alert and action line and beyond the action line were also similar in both the groups.

Table 3 compares the mode of delivery among both the groups. Most of the patients underwent normal vaginal delivery (73%, 74%). Those who needed an operative vaginal delivery or a caesarean section were also statistically similar with p value of more than 0.05.

As seen in Table 4, The most common indication for operative vaginal delivery and caesarean section was arrest of fetal descent in both the study groups. Similarity was seen in the pattern of labor abnormalities in both the groups.

The neonatal outcomes – in terms of mean birth weight, mean APGAR score at birth and need for NICU admission were similar in both the partograph groups. (Table 5)

### 4. Discussion

Partograph is an essential labour management tool. Various studies have been conducted so far to evaluate the advantages and disadvantages of different types of partographs. This present study was conducted to compare the WHO modified partograph and the paperless partograph with 100 patients in each group.

The mean maternal age of patients in our study was 27.51years in WHO partograph group and 27.76years in paperless partograph group and the difference was not statistically significant. In other studies done by Deka et al<sup>7</sup> and Bhuvaneshwari et al<sup>8</sup> the mean age of patients was  $26\pm 3.6$  and  $23.49\pm 2.4$  (group I) respectively and  $25\pm 3.2$  and  $23.35\pm 2.8$ (group II) respectively which was similar for both the groups. Majority of the patients in our study were primigravida in both the groups (p 0.604) and similar findings were seen by Bhuvaneshwari et al.<sup>8</sup> The

mean gestational age in WHO and paperless group was 38.36weeks and 38.24 weeks respectively. Similar results were seen by Bhuvaneshwari et al.<sup>8</sup> and Akhtar et al.<sup>5</sup> where participants had comparable gestational ages - 37.7weeks and 38.6weeks in group I and 39weeks and 38.7 weeks in group II respectively.

In our study, there was no significant difference in the mean duration of active phase of labour when monitored using the WHO modified partograph and the paperless partograph. This was similar to Bhuvaneshwari et al<sup>8</sup> where the duration of active labour was 248.3minutes (WHO group) and 241.4minutes (paperless group) with no significant difference.

In the present study we found that the paperless partograph was as effective as the WHO partograph in monitoring labour progress. 73% patients delivered before the alert line in group I and 69% delivered before alert ETD in group II which as similar to Bhuvaneshwari et al<sup>8</sup> where 77% and 72% delivered before alert line/ETD with no statistical significance. Veena et al<sup>9</sup> showed 76% and 83% patients delivering before alert ETD/line in group I and group II respectively. Akhtar et al<sup>5</sup> observed the highest rate of normal progression of labour with 88.5% (Group I) and 87.5% (Group II) delivering before the expected time. In our study, 17% and 25% patients in WHO group and paperless group respectively crossed the alert line/ETD while 10% and 6% in respective groups crossed the action line/ETD, however the difference was not statistically significant. Veena et al<sup>9</sup> also showed similar results with 18% crossing the alert line and 6% crossing the action line in WHO group as compared to 14% crossing the alert ETD and 3% crossing action ETD in paperless partograph group. Another study conducted by Faswila et al<sup>10</sup> showed 18% and 8% delivered beyond alert line and beyond action line in the WHO group and 14% and 2% patients delivered beyond alert ETD and beyond action ETD in paperless group respectively.

Most women in our study had a normal vaginal delivery with 73% in Group I and 74% in Group II. Other studies showed similar results, Deka et al.<sup>7</sup> found vaginal delivery in 88.5% (Group I) and 85% (Group II). In study by Veena et al<sup>9</sup> this proportion was 79% and 85% in Group I and II respectively and by Akhtar et al<sup>5</sup> it was 93.5% and 94% respectively. There was no statistical significance in the number of normal vaginal deliveries. Caesarean section was needed in 22% Group I and 15% Group II in our study. These findings were comparable to other studies done by Deka et al.<sup>7</sup> Bhuvaneshwari et al<sup>8</sup> and Faswila et al<sup>10</sup> who reported caesarean section rate as 10.5%, 12% and 18% respectively in WHO Group and 6%, 11% and 13% respectively in paperless group with no statistical significance in any study. Akhtar et al (Aligarh)<sup>5</sup> reported the lowest rate of caesarean section - 4.5% (Group I) and 4% (Group II).

**Table 1:** Demographic parameters of patients in group I and group II

Parameter	WHO modified partograph Group I (n=100)	Paperless partograph Group II (n=100)	p value
Age (mean in years)	27.51 ± 4.68	27.76 ± 3.90	0.766
Parity : Primigravida Multigravida	56 (56%) 44 (44%)	55 (55%) 45 (45%)	0.604
Antenatally booked	89 (89%)	85 (85%)	0.400
Gestational age (mean in weeks)	38.36 ± 0.99	38.24 ± 0.95	0.772

**Table 2:** Labour characteristics of patients in group I and group II

	WHO modified partograph Group I (n=100)	Paperless partograph Group II (n=100)	p value
<b>Nature of onset of labour:</b>			
Spontaneous Induced	68 (68%) 32 (32%)	72 (72%) 28 (28%)	0.537
<b>Need of augmentation with oxytocin:</b>			
Augmented Not augmented	73 (73%) 27 (27%)	72 (72%) 28 (28%)	0.239
<b>Duration of labour (in minutes):</b>			
Mean duration of active phase of labour	285.0 ± 168.7	295.7 ± 167.7	0.507
<b>Time of delivery</b>			
Before Alert line/ETD	73 (73%)	69 (69%)	0.273
Between alert and action line/ETD	17 (17%)	25 (25%)	0.403
Beyond action line/ETD	10 (10%)	6 (6%)	0.138

**Table 3:** Mode of delivery

	WHO modified partograph Group I (n=100)	Paperless partograph Group II (n=100)	p value
Normal vaginal delivery	73 (73%)	74 (74%)	0.178
Operative vaginal delivery	5 (5%)	11 (11%)	0.170
LSCS	22 (22%)	15 (15%)	0.288

**Table 4:** Indication for operative vaginal delivery/LSCS

Indication of operative vaginal delivery and caesarean section	WHO modified partograph Group I (n=25/100)	Paperless partograph Group II (n=28/100)	p value
Arrest of descent	7 (28%)	9 (32%)	0.682
Arrest of dilatation	5 (20%)	5 (18%)	0.460
Protracted descent	6 (24%)	4 (14%)	0.250
Protracted dilatation	1 (4%)	6 (22%)	0.469
Fetal distress	6 (24%)	4 (14%)	0.748

**Table 5:** Neonatal outcomes

Parameters	WHO modified partograph Group I (n=100)	Paperless partograph Group II (n=100)	p value
Birth weight in grams (mean ± SD)	2889.65 ± 349.44	3006.76 ± 381.79	0.171
Apgar score at birth (mean ± SD)	8.3 ± 1.2	8.3 ± 1.2	0.910
Need of NICU admission	34 (34%)	35 (35%)	0.882

There was no significant difference in the neonatal outcomes observed during our study between the two types of the partograph. Mean apgar score of neonates at birth was 8.3±1.2 in both the groups which was not significant. Similar results were seen in other studies by Deka et al.<sup>7</sup> Bhuvaneshwari et al<sup>8</sup> and Reshma et al<sup>11</sup> where most of the neonates had normal Apgar score of ≥7 at birth with no statistically significant difference as per the type of

partograph used. Our study showed that in group I only 34% and in group II 35% neonates were admitted to NICU. This proportion was found to be 22% and 18% by Bhuvaneshwari et al.<sup>8</sup> with no statistical significance. Akhtar et al<sup>5</sup> had relatively lower rate of nursery admissions with only 7% babies in Group I and 5.5% babies in Group II (not significant).

## 5. Conclusion

The present study was conducted to assess the utility of the WHO modified partograph and the paperless partograph in the management of patients during labour. It can be said from the above findings that the paperless partograph is equally effective to the WHO modified partograph. The paperless partograph does not need any graphical representation and the expected time of delivery can be routinely mentioned on the patient management sheet and it may be considered easier to implement.

Our study concludes that the paperless partograph is as good as the WHO modified partograph in predicting progression of labour, labour abnormalities and its outcomes. Therefore, the paperless partograph can be adopted as an alternative to the WHO modified partograph in busy labour room settings.

## 6. Source of Funding

None.


## 7. Conflict of Interest


None.

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