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## RESEARCH ARTICLE

### PAPERLESS PARTOGRAM – A SIMPLE AND ACCEPTABLE ALTERNATIVE TO WHO MODIFIED PARTOGRAPH IN RESOURCE POOR SETTING

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#### ABSTRACT

**Background:** labour is a natural process of child birth. The partograph is a graphical representation used to monitor labour. Close monitoring of labour and early detection of prolonged and obstructed labour can prevent disastrous complications. WHO modified partograph is universally adopted for monitoring labour. However, inspite of its universal recommendation it is rarely used. The major drawback for its non compliance is its complex nature of graph and shortage of doctors and nurses. Dr Debdas introduced paperless partogram for monitoring labour which is graph less, simple, non time consuming, and two step calculation. It calculates alert ETD (Estimated Time of delivery) and Action ETD to arrive at accurate time to intervene for ensuring a safe delivery. **Objective:** The present study was done to evaluate the simplicity, acceptability, user friendliness and also to determine overall use of paperless partograph in comparison to WHO modified Partograph. **Methods:** 400 pregnant women with singleton uncomplicated term pregnancy with cephalic presentation were included and divided into two groups of 200 each and their progress of labour and outcome were followed. Group A was followed using Paperless partogram and Group B using WHO modified Partograph. 16 resident working in Labour room in shifts were asked to fill either of partographs for monitoring labour and outcome. A total of 200 partograph were randomly checked for completeness. A structured questionnaire with score from 1 to 10 was used to analyze preference of residents for using either of the two partograph. **Results:** It was found that maternal and perinatal outcome were similar in group A and B ( $p>0.05$ ). However, paperless partograph was more acceptable, simple and user friendly than WHO modified partograph ( $p<0.0001$ ) and the difference was highly significant. **Conclusion:** The paperless partograph was found to be equally effective in monitoring and management of low risk labour as WHO modified partograph. However it was more acceptable and user friendly among residents and nurses. Thus paperless partograph may be a good alternative to WHO modified partograph to monitor labour in a facility with less staff and high patient load.

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## INTRODUCTION

Globally around 8% of all maternal deaths in the year 2000 were attributed to prolonged labour (World Health Organization, 1990). Moreover prolonged labour is associated with significant maternal morbidity due to sepsis, post partum hemorrhage, rupture uterus and urinary fistula. The partograph was originally developed by Friedman in 1954 and subsequently modified by Philpott and Castle with the inclusion of Alert and Action Lines (Philpott, 1972).

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The WHO introduced partograph in safe motherhood conference (World Health Organization, 2004) which was later modified in early 2000 (Pujar, 2016). Partograph is a pre printed paper that graphically represents progress of labour. Salient features of mother and baby is plotted against time. It has been advocated as one of most important advances in obstetric care (Debdas, Debdas, 2006; Lingegowda, 2014). It has been almost 20 years since WHO recognized partograph as an essential tool in labour monitoring, however its use is infrequent and interpretation is often inappropriate (Friedman, 1963). There are multiple factors that are responsible for non compliance like less staff, high patient load, non availability of partograph paper in labour ward, lack of knowledge and most importantly complex face of the graph (Friedman, 1954; World Health Organization, 2004; Kushwah, 2013; Groeschel, 2001).

Dr Debdas argued that the present WHO Modified partograph is not suitable for resource poor country like India. For this he introduced the Paperless partograph which is a simple, graphless, nontime consuming two step calculation. It is based on Friedman's rule that dilatation of cervix occurs at 1cm/hour with the start of active phase (Dr Debdas, 2006; Debdas, 2006). The present study was done to compare the simplicity, acceptability and user friendliness of Paperless partograph in comparison to WHO modified partograph and also to assess which was more preferable by resident doctors for labour monitoring.

## MATERIALS AND METHODS

The study was carried out in the Department of Obstetrics and Gynecology, JN Medical College and Hospital, AMU, Aligarh from June 2017 to July 2019.

### Inclusion Criteria

- Pregnant women irrespective of age & parity
- Singleton pregnancy
- Gestational age from 36 to 42 weeks
- Cephalic presentation
- Women with  $\geq 4$ cm dilatation at the time of inclusion.

### Exclusion Criteria

- Non cephalic presentation
- Known foetal structural anomaly
- Previous c/s or uterine surgery
- Premature or post-dated pregnancy
- Epidural analgesia
- Maternal co morbidities/ high risk pregnancy

## METHODS

Ethical clearance was obtained from institutional ethical committee. Participants were included only after an informed and written consent. Admitted pregnant women were examined after taking detailed obstetrics and gynaecological history. Women fulfilling inclusion criteria were randomly assigned to one of the 2 groups- paperless partogram and the modified WHO partograph for monitoring in active phase of labour  $\geq 4$ cm of cervical dilatation. It entails only 5 min/case.

### GROUP A (PAPERLESS PARTOGRAM)

In paperless model of study we calculated an ALERT ETD and an ACTION ETD.

**ALERT ETD** - Friedman's rule that cervix dilates @1cm/hr, was used to calculate the ETD<sup>11</sup>. Therefore, 6 hrs is simply added to time at which women was 4 cm dilated to get ALERT ETD.

**ACTION ETD** - 4 hours was added to Alert ETD to get Action ETD. Both ETDs were written in **big letters** on front of the case sheet and Action ETD was circled in **RED**. Whole procedure was paperless/graphless and was done in split second mental calculation

**ALERT ETD**- After Alert ETD, if a woman did not deliver, clinician was alerted and sensitized and careful monitoring and intervention was done accordingly.

For example if contractions were poor, labour was augmented by oxytocin or ARM. A mandatory PV examination was done at this point of time.

**ACTION ETD** - If she did deliver spontaneously by this extra 4 hours, then she was at risk of prolonged labour and needed delivery by suitable technique- instrumental vaginal or caesarean section. The difference between ALERT ETD & ACTION ETD i.e. 4 hours denoted the timing for intervention of prolonged labour. It was in accordance with WHO modified partograph recommendation where difference between ALERT LINE & ACTION LINE was 4 hours.

### MONITORING OF LABOUR

Following was written in case sheet directly and instantly. FHR, liquor and contraction in 10 minutes - every  $\frac{1}{2}$  hourly BP and Temperature - 1hourly. PV Examination- 4 hourly to see dilation of cervix, and descent and moulding of head.

### GROUP B (MODIFIED WHO PARTOGRAPH)

Events of labour were followed according to WHO modified partograph. The two groups were followed till delivery. Both maternal and fetal outcomes were documented at bottom of graph or case sheet. Details of labour included:

- Duration of labour
- Mode of delivery
- Maternal complication like prolonged labour, obstructed labour, Operative interventions, PPH.
- Foetal outcome like birth weight, APGAR Score, NICU admission

### Comparison between the two groups was done on the basis of

- Labour that crossed Alert ETD & Action ETD and Alert Line & Action Line
- Rate of caesarean section
- APGAR score and NICU admission
- Duration of hospital stay.

For Determining simplicity and acceptability of paperless partograph in low resource setting, 200 partograph of 100 each type were analyzed over a course of time in relation to documentation of different parameters as needed on partograph. There were 16 residents working each day in labour room and they were instructed to use either of the two partographs for monitoring of labour and were also asked to share their personal experience and give score out of 10. The parameters used were; 1) Simplicity 2) Acceptability 3) User friendliness 4) teachability 5) Overall utility

**Statistical Analysis:** The collected data was entered in SPSS 20 and was analyzed using the Chi Square Test and student T test.

## RESULTS

During the study period the labour progress of 200 women were followed using paperless partogram and 200 using WHO modified partograph. The baseline characteristics of the women are as given Table 1.

**Table 1. Baseline characteristics of women**

Variable	Range	Group A	Group B
Age (Years)	18- 40	24.68±3.8	24.93±3.7
Nutritional status(BMI)	16- 31	22.8±1.4	23.0 ±1.1
Gestational Age (weeks)	37- 41	38.63±1.24	38.71±1.25

In our study maximum number of women were less than 25 years of age. The mean age of the women in Group A was 24.68±3.8years and Group B was 24.93±3.75 years respectively and the difference was not significant ( $p = 0.513$ ) As seen in Table 2, there were 87.5% of women who delivered before alert ETD in Group A and 88.5% before Alert Line in Group B respectively and the difference was not significant ( $p= 0.710$ ).

**Table 2. Delivery in relation to Alert and Action ETD/Line**

Proportion of total deliveries that took place	Group A (N=200)	Group B (N=200)
Within Alert ETD/ Alert Line	175(87.5%)	177(88.5%)
Between Alert ETD/ Alert Line and Action ETD & Action Line	19 (9.5%)	14 (7%)
Beyond Action ETD/ Action Line	6 (3%)	9 (4.5%)

**Table 3. Mode of Delivery**

Mode of delivery	Group A(n=200)	Group B(n=200)	P value
Normal vaginal delivery (FTND)	188(94%)	187(93.5%)	
Caesarean section( LSCS)	8 (4%)	9(4.5%)	
Instrumental Vaginal delivery( ventouse / Forceps)	4(2%)	4(2%)	0.804
Augmentation needed	28%	25%	0.261

**Table 4. Assessment of Documentation**

Variables (complete data entry)		Group A (n=100)	Group B(n=100)
Fetal parameter	FHR	99%	98%
	Color of Liquor	99%	96%
Progress of Labour	Cervical Dilatation	100%	98%
	Descent of Head	99%	95%
	Uterine Contraction	99%	97%
Maternal Parameter	PR	100%	96%
	BP	98%	95%
	Temperature	-	73%

**Table 5. Assessment of score (out of 10) for various parameters**

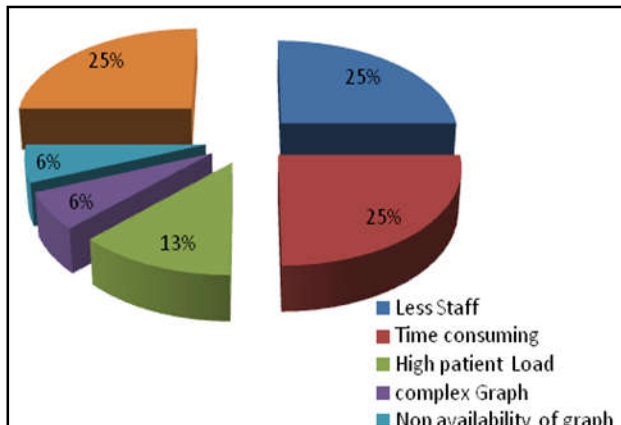
variables	paperless partogram	WHO Modified Partograph	P value
Simplicity	8.25±1.238	5.4±1.078	<0.0001
Acceptability	8.25±0.930	5±1.590	<0.0001
User friendliness	8.56±0.892	6.43±0.89	<0.0001
Teachability	8.25±0.774	4.12±1.204	<0.0001
Over All usefulness	7.75±0.774	8.00±0.730	0.467

9.5% women in Group A delivered between alert and action ETD, and only 3% delivered beyond action ETD in Group A, similarly in Group B, delivery between both lines were 7% and only 4.5% crossed Action line and the difference was not Significant ( $p=0.504$ ). It was observed that most of women in both group followed a normal curve of labour and delivered within 4.30 hrs of entering in active labour. The mean duration of labour in Group A was 3.53 hours and Group B was 3.40 hours respectively. Majority of women in our study had spontaneous vaginal delivery as seen in Table 3.

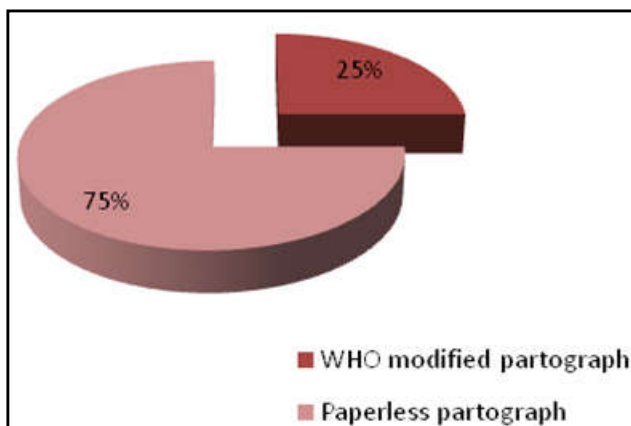
There were 94% FTND in Group A and 93.5% in Group B respectively. There was 4% and 4.5% Caesarean section in Group A and B respectively and 2% instrumental vaginal delivery in both Groups. The mean baby weight in Group A was 2.90 ±0.4kg and 2.91±0.4kg for Group B respectively and the difference was not significant ( $p=0.813$ ). There were 7% babies born to mother in Group A that required NICU admission and for Group B it was 5.5% and majority was for Low Birth Weight. 200 partographs were randomly analyzed for completeness of parameters, of which 100 belonged to each type. It was observed that while 95% of paperless partogram were complete only 73% of WHO modified partograph was completely filled as seen in Table 4. Of all the parameter cervical dilatation and FHR was most commonly filled and temperature and BP being the least maintained. There were 16 resident doctors working in labour room in shifts. As anticipated from the incompletely filled graph in Table 5, around 3/4<sup>th</sup> of residents expressed difficulty with WHO

modified partograph and found paperless model easier to use, maintain and plot. The factors responsible for non compliance of WHO modified partograph were less staff, time consumption, high patient load, complex graph ,non availability of paper and others as shown in Figure 1. On analysis as shown in Table 6 it was found that the out of 10 score as per residents for simplicity , acceptability, User friendliness and teachability was lower for WHO modified partograph than Paperless partogram and the difference was highly significant( $P<0.0001$ ). In terms of overall usefulness it

was seen that both partographs were similar and were equally helpful in detecting abnormal labour and hence its complications ( $p=0.46$ ). The residents also found the paperless partogram easier to teach and train others.



**Figure 1. Factors for Non compliance of partograph**



**Figure 2. Preference of Residents**

Even nursing and paramedical staff could be easily taught about how to use it and its necessary interpretation. Regarding personal preference 12 out of 16 residents (75%) agreed that they would use paperless partogram if given choice between paperless model and WHO modified partograph (25%) as shown in Figure 2.

## DISCUSSION

Our study included 400 women divided into 2 groups and Group A was followed using Paperless Partogram and Group B using WHO modified partograph and fetomaternal outcome were followed. The mean age in our study was 24.68 years in Group A and 24.93 years in Group B. In a similar type of study done by Agarwal et al. (2013) the mean Age was 25.36 years and by Veena L et al. (2018) the mean age in Group A and B was 25 years. The mean gestational age in Group A was 38.6 weeks and Group B was 38.7 weeks respectively. In study done by Deka G et al. (2015) the mean gestational age in Group A and B were 37.7 and 37.6 weeks respectively. In another study by Mohammad et al. (2017) the mean gestational age was 39 weeks in both groups. Majority of women in our study had vaginal delivery before alert ETD/line, it was seen that 87.5% in Group A delivered before alert ETD and 88.5% in Group B before Alert Line. This finding was similar to study done by Deepak Kumar Giri et al. (?) where 80% in Group A

and 81% in Group B delivered before Alert ETD/line. In study by Deka G et al (2015) this proportion was 83% and 77% in Group A and B respectively. In our study most women had spontaneous vaginal delivery. FTND in Group A was 94% and Group B was 93.5%. Similar observations were seen in study by Deka et al. (2015) where FTND in Group A and B was 88.5% and 85% respectively. Veena et al. (2018) found vaginal delivery in Group A and B as 85% and 79% respectively. It was observed that in spite of being in regular use WHO modified partograph was not completely filled due to complex nature. Only 73% of WHO partograph was filled as against 98% of paperless partograph. In study by Deka G et al (15) only 75% of WHO partograph was filled as against 96.7% in paperless partogram. Similar observation was seen in Fatma About Khair et al. (2017) where 70.9% of paperless partograph and 60.6% of WHO partograph were completely filled. Our study found paperless partograph was easier to use, less time consuming and more user friendly when compared to WHO modified partograph. The mean score for paperless partogram given by residents were higher for simplicity, acceptability, User friendliness and teachability. It was however seen that score for overall use was almost similar for both partographs. Similar observation was seen by Deka et al. (2013) where score for user friendliness was 7.9 for paperless partogram and 3.6 for WHO modified partograph. In a study by Veena et al. (2018) score for user friendliness was 8.1 and 3.65 respectively for both partographs. In our study most resident doctors 12 out of 16 (75%) wanted to accept paperless partogram as labour monitoring tool instead of WHO modified partograph if given choice.

## Conclusion

We in our study found Paperless partogram ideal for resource poor setting. The paperless partogram is easier to plot, maintain and can be interpreted by those with minimal formal training on it. In terms of acceptability, user friendliness, simplicity and teachability paperless partogram scored better than WHO modified partograph. It is, therefore, concluded that it may be prudent to use paperless partogram as an alternative to WHO modified partograph for monitoring low risk labour in poor resource setting like India where there is dearth of doctors and nurses.

**Conflict of interest:** None declared.

**Ethical clearance:** Taken.

**Source of funding:** None declared.

## Declarations

The Article is original with the author(s) and does not infringe any copyright or violate any other right of any third parties; (2) The Article has not been published (whole or in part) elsewhere, and is not being considered for publication elsewhere in any form, except. As provided herein; (3) all author (s) have contributed sufficiently in the Article to take public responsibility for it and (4) all author (s) have reviewed the final version of the above manuscript and approve it for publication

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