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"Evaluation and Monitoring of Labour by Who Modified Partograph"

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Abstract **Original Research Article**

Partograph is an irreplaceable tool in the labour management, and serves as an "early warning system", detects and prevents deviation from normal progress of labour, and ensures that proper intervention is taken in due course of time. The main objectives of the study was to compare the labour outcome, indicated by the mode of delivery, duration of labour, need for labour augmentation, neonatal outcome assessed by neonatal APGAR scores, and any maternal complications between the two groups. This was a hospital-based randomised, prospective comparative study. 600 Patients with uncomplicated term pregnancies with single live fetus in vertex presentation were included in the study. Results were compared between 600 cases (Study group), where labour was monitored with WHO Partograph and 600 cases (Control group), where labour was monitored without any Partograph. There was a significant increase in the rate of spontaneous vaginal delivery rate (p value<0.0001) in the study group, whereas duration of labour and need for labour augmentation were significantly reduced in the study group (p value<0.001). A significant reduction in the rate of Caesarean section in study group (p value<0.001). Fetal outcome was better in the study group, assessed by APGAR score at 1 minute and 5minutes of birth and need for NICU admissions. There was a significant reduction in the maternal morbidity in the study group, indicated by postpartum haemorrhage, wound complications. Therefore, WHO Partograph is an inexpensive but golden tool in modern obstetrics.

Keywords: Labour, WHO Modified Partograph, labour outcome, fetal outcome, maternal outcome.

INTRODUCTION

Labour is a dynamic process, leading to childbirth, and has been regarded as the most critical event in a woman's life, as even an apparantly normal course of labour may get complicated at any point of time and may lead to adverse maternal and perinatal outcomes, and within a short period of time, the greatest gift of nature may turn out to be a threat to her life. The older belief stating that "the sun should never set twice in a labouring woman" is one of the crude but scientific approaches to estimate the length of labour approximately. Any labour that is unduly prolonged has been associated with a number of maternal (such as Obstructed labour, Postpartum haemorrhage, traumatic deliveries, puerperal sepsis, vesicovaginal fistula) and fetal (fetal hypoxia, sepsis, stillbirths) complications. Early detection of abnormal progress of labour and prevention of prolonged labour can reduce these complications [1].

Approximately half a million women lose their lives every year owing to the complications of pregnancy, most of which are avoidable. Obstructed labour and rupture uterus accounts for upto 70% of maternal mortality. Maternal mortality ratio in India in 2015 is 174 per 100,000 live births, which is about 15 times higher as compared to developed countries [2, 3].

The anticipation of complications and measures to prevent such complications should be the principles of modern obstetrics, rather than managing the problem too late after the appearance of complications. Therefore prevention and subsequent elimination of prolonged labour is the key to proper management of labour.

This implies the need for monitoring of labour process, so that labour can be managed perfectly and abnormal labour can be detected at the earliest possible stage. Monitoring of the events would be easier if these can be placed on a sheet of paper with definite columns for different aspects of the mother and the fetus. Obstetricians in rural service will be more precise in detecting abnormality so that early referral to the central hospital becomes possible for appropriate management. The availability of this partogram was considered an

important advance in modern obstetrics and is applicable to low as well as high resource settings. Partogram aids for the early diagnosis and management of pathological labour.

Partogram prevents deviation from normal progress of labour, and ensures that proper intervention is done in due course of time. It aids the systematic approach with careful diagnosis, regular assessment and decisive actions like amniotomy, augmentation of labour with oxytocin and caesarean section [4].

The World Health Organisation (WHO) has produced and promoted partograph as a part of Safe Motherhood Initiative launched in 1987, and concluded that partograph is a necessary tool in the management of labour, and its universal application is recommended [5].

The first WHO partograph or 'Composite partograph' covers a latent phase of labour of upto 8 hours and an active phase beginning when the cervical dilatation reaches 3 cm. The active phase is provided with an alert line and an action line, drawn 4 hours apart on the partograph as aid to monitoring labour [4].

This partograph is based on the principle that during active labour, the rate of cervical dilation should not be slower than 1 cm/hour. A lag time of 4 hours between slowing of labour and the need for intervention is unlikely to compromise the foetus or the mother and avoids unnecessary intervention [1].

But there were some limitations on routine practice of this original partograph,

- Prolonged latent phase of labour which was included in the original partograph, is relatively infrequent, and is not associated with adverse perinatal outcomes
- Lack of standard universally acceptable definite criteria to diagnose labour, and to differentiate the latent phase from false labour
- Unnecessary interventions in the form of increased referral to tertiary care centre, augmentation and increased rate of caesarean section [4].

Keeping in mind these limitations, in 2000, a new version of partograph, "WHO Modified Partograph" was introduced, in which latent phase was removed, and beginning of the active phase was considered to be at 4cm of cervical dilatation, instead of 3cm. There were other minor changes also which included considering two squares in 1 hour instead of one square in 1 hour in the cervical dilatation curve. This is more users friendly and monitoring of labour is associated with lesser incidence of caesarean section and better outcome of pregnancy. [6].

The present study has been done to monitor the patients using WHO Modified Partograph and to evaluate the impact of WHO modified partograph in labour management.

In this study, we attempted to study 1200 patients in active phase of labour, out of which, 600 cases were monitored using WHO modified Partograph and managed accordingly, whereas in the rest 600 cases, labour was managed clinically, without using Partograph in the Department of Obstetrics and Gynaecology of Gauhati Medical College and hospital, Guwahati from 1st August 2018 to 31st July 2019.

MATERIALS AND METHODS

This study was a randomised, prospective comparative study entitled "Evaluation and Monitoring of Labour by WHO Modified Partograph" undertaken in the Department of Obstetrics and Gynaecology, Gauhati Medical College, Guwahati Assam. The study was approved by the Institutional Ethical Committee.

A total number of 1200 cases admitted in labour room, with singleton, uncomplicated term pregnancy in active labour were equally divided into two groups randomly. In one group, labour was monitored with protocols and guidelines as specified in the WHO Modified partograph, was called as Study group, while in another group, the whole duration of labour was monitored without using any partograph, and was called as Control group.

Patients admitted to the labour room after taking full history and examination as per proforma and routine investigations were sent.

Inclusion criteria: term pregnancies with single live fetus in vertex presentation after 37 weeks of gestation in active labour with dilatation more than 4cm, and patients who were willing to participate in the study after informed and written consent

Exclusion criteria: Women with medical complications such as Anemia, Hypertension, Diabetes, immunocompromised states

Women with Obstetrical complication such as Multiple pregnancies, Malpresentations, Post caesarean pregnancies, Preterm labour, Intra-uterine Growth Restriction (IUGR), Intra-uterine Fetal Death (IUFD), Severe pre-eclampsia or eclampsia, Antepartum Haemorrhage and placenta previa, Post-term pregnancy.

Women fulfilling the inclusion criteria were selected and allotted randomly into the study and control groups. WHO Modified Partograph plotting was started at the onset of active labour, at cervical dilatation of $\geq$ 4 cm. Individual partograph was maintained for individual patient. The course of labour was monitored as described below:

Assessment of Fetal Condition

Fetal Heart Rate (FHR)

The fetal heart rate was listened to before, during and after the contraction to elicit the abnormalities in baseline rate and to detect any deceleration in relation to uterine contractions, and was recorded in the top, every half hourly with a dot (.) in the area provided in the partograph for FHR recording.

Normal FHR 120-160 beats per minute with regular rhythm
Abnormal FHR, which could be Tachycardia- FHR above 160beats per minute
Bradycardia- FHR below 120 beats per minute.

State of Membranes and Liqour

If the foetal membranes are intact, letter '**I'** (for 'intact') is written.

If the membranes are ruptured and

- liquor is absent- **'A'** (for 'absent')
- liquor is clear- **'C'** (for 'clear')
- liquor is blood-stained- '**B**'(blood stained)
- liquor is meconium-stained- **'M'**

Moulding of the fetal head is an important indicator of how adequately the pelvis can accommodate the fetal head.

Progress of Labour

Cervical dilatation measured in centimeters is plotted on cervicograph. According to the WHO guidelines, the cervical dilatation on admission, taken at zero hours was plotted on the alert line, from 4 centimeters, with a mark 'X'. Further vaginal examinations were carried out at 4 hourly intervals.

Alert Line- A line drawn from a dilatation of 4 cm to 10 cm at a rate of 1 cm per hour
Action Line- A line parallel and 4 hours to the right of the alert line

The subsequent deviation of the cervicograph to the right of alert line is considered as a warning sign. When cervicograph has reached or crossed the action line, the patient was reassessed to find out the further course of management.

The patients were divided into three groups on the basis of their relation to alert and action lines

- **Group I** : Patients whose cervical dilatation curve lies to the left of alert line, and has not crossed alert line
- **Group II** : Patients whose cervicograph crosses alert line but not action line
- **Group III** : Patients whose cervicograph crossed action line, and lies to the right of action line

Descent of fetal head

Descent of fetal head measured by abdominal palpation and is expressed in terms of fifths above the pelvic brim. The width of five fingers is a guide to the expression in fifths of the head above the brim for convenience.

Uterine contractions

The contractions are assessed on the basis of the frequency as well as the duration of the contractions, frequency assessed by the number of contractions a woman is having in a 10minutes period. The duration of contraction is the interval between the first onset of contractions, palpable per abdominally to the time when the contraction passes off, measured in seconds.

Maternal Condition

Maternal condition assessed by recording of pulse, blood pressure, temperature, dehydration and by performing urinalysis.

Neonatal condition

Neonatal condition at birth was assessed by APGAR score of the newborn immediately at one minute and five minutes after birth.

Post-delivery check-up

Patient's vitals were monitored in the immediate postpartum period. Pulse, blood pressure, tone of uterus, any vaginal bleeding or haematoma formation was checked.

Puerperium and discharge from hospital

Following delivery, patients were kept in postnatal ward. The general condition of the patient, milk secretion, uterine involution, lochia and any other complications were noted.

STATISTICAL ANALYSIS

The data obtained was analysed by using appropriate statistical tests and *p* value was determined. Data Analysis was performed with the Statistical Package for Social Sciences software 21.0 versions (SPSS, 21.0 Chicago, Illinois, USA). Level of significance (p value) $\leq$ 0.05 was considered as significant and $\leq$0.001 as highly significant.

OBSERVATION AND RESULTS

The number of booked cases was more than the total number of unbooked cases, in both study and control grouping, as is evident from the table. The number of booked cases getting admitted during emergency hours was highest in the study group (53.5%) as well as in control group (52.67%).

The study and control groups were identical in age and parity distribution, comprised of 300 primigravidae and 300 multigravidae in each study and control groups, with highest number of patients were

found in the age group between 20-25years. Primigravidae predominated the age group less than 25 years, whereas multigravidae in the age group more than 25 years.

As shown in Table 1, the rates of spontaneous vaginal delivery were higher among the study group (82.30%), as compared to 70.50% in control group. The rate of instrumental vaginal delivery was reduced from 11.70% in the control group to 8.5% in the study group, and there was significant reduction in the caesarean section rates from 17.80 % in the control group to 9.20% in the study group (p value<0.0001).

Table-1: Showing overall comparison of mode of delivery between study and control groups

MODE OF DELIVERY	STUDY GROUP		CONTROL GROUP		P value <0.0001
	CASES	PERCENTAGE	CASES	PERCENTAGE	
SVD	494	82.30%	423	70.50%	
OPERATIVE VAGINAL	51	8.50%	70	11.70%	
LSCS	55	9.20%	107	17.80%	
TOTAL	300	100%	300	100%	

Table 2 shows the comparison of duration of labour between study and control group, and 97% of the patients in the study group were delivered within 12 hours, while among the control group, 88.67% cases delivered within 12 hours, whereas 11.33% cases were prolonged for more than 12 hours, but all of them delivered within 16hours. None of the cases were allowed to exceed 16 hours in either of the groups. The findings were statistically highly significant (p value <0.001).

Table-2: Showing overall duration of labour in study and control groups

DURATION OF LABOUR	STUDY GROUP		CONTROL GROUP		P value <0.0001
	CASES	%	CASES	%	
<12 HOURS	582	97%	532	88.67%	
12-16 HOURS	18	3%	68	11.33%	
>16HOURS	0	0	0	0	
TOTAL	600	100%	600	100%	

Among primigravidae, the reduction in the incidence of labour prolongation for more than 12 hours was from 15.0% in the control group to 3.30% in the study group, and this was statistically highly significant (p value< 0.001), whereas in multigravidae, Among the multigravidae, this was 7.70% in the control group, and reduced to 2.70% among the study group, which was significant (p value 0.006).

Table 3 shows the mean duration of labour among groups. The mean duration of first stage of labour was shorter, 4.93±2.34 hours in the study group as compared to 5.48±2.49 hours in the control group, and second stage duration 32.79±17.1 minutes in study group while 36.32±19.96 minutes in control group. (p value<0.001).

Table-3: Showing means duration of labour of study and control groups

MEAN DURATION OF LABOUR	STUDY GROUP	CONTROL GROUP	P value <0.001
FIRST STAGE	4.93±2.34 HOURS	5.48±2.49 HOURS	
SECOND STAGE	32.79±17.11 MINUTES	36.32±19.96 MINUTES	
THIRD STAGE	5.37±1.11 MINUTES	5.36±1.07 MINUTES	
TOTAL DURATION	5.32±2.34 HOURS	5.87±2.57 HOURS	

Table 4 shows that the requirement of vaginal examinations was far less in the study group as compared to the control group. In the study group, 19.20% of the patients required PV examination for 3-4 times, compared to 30.20% in control group. In study group, none of the patient required P/V examination for more than 4times, whereas it was 4% in control group. The frequency of vaginal examinations required were significantly reduced in the present study as compared to the control group (p value <0.0001).

Table-4: Showing frequency of per-vaginal examinations

NO. OF VAGINAL EXAMINATIONS	STUDY GROUP		CONTROL GROUP		P value <0.0001
	CASES	PERCENTAGE	CASES	PERCENTAGE	
1-2	485	80.80%	395	65.80%	
3-4	115	19.20%	181	30.20%	
≥5	0	0%	24	4%	
TOTAL	600	100%	600	100%	

The requirement of augmentation of labour was reduced, in 12.3% of cases in the study group whereas in 25.5% in the control group which is statistically highly significant (p value<0.001).

Fetal outcome was assessed by APGAR scores at 1minute and 5minutes. In study group, APGAR score less than 6 at 1minute of birth was seen in 27cases (4.5%), as compared to 55 (9.20%) cases in the control group, whereas APGAR score less than 6 at 5minutes of birth was seen in 16 (2.7%) cases, whereas there were 26 (4.3%) cases of birth asphyxia in the control group, which was significant (p value 0.001).

Among the study group, there were 22 admissions in NICU, out of which 18 were delivered by Caesarean section for fetal distress and prolonged labour, while 4 were delivered by instrumental delivery for fetal distress in second stage of labour. In control group, 35 NICU admissions were there. There was a highly significant association between the study and control groups and NICU Admissions of the baby (p value <0.001). There was no maternal or perinatal mortality in the present study.

There was a significant association between maternal complications in study and control groups. In the study group, there were 4 cases out of 600 where PPH (Postpartum haemorrhage) occurred, out of which 2 cases had atonic PPH, controlled by conservative management, whereas the other 2 cases had traumatic PPH following instrumental delivery, followed by repair of tear, and 1 unit of blood transfusion. Amongst control group, there were 21 cases of PPH, out of which 18 cases occurred due to atonic causes, and were controlled by conservative treatment. 1 case was due to traumatic cause and was followed by repair of tear. Another 3 cases were due to retained bits of placenta and was followed by evacuation of the products. There were 3 cases of Puerperal pyrexia among the control group, but none in the study group. There were 14 cases of wound infections in the control group, while it was 4 among the study group (p value<0.001).

DISCUSSION

The results in our study provide evidence that the use of WHO Modified Partograph with a simple management protocol improves outcome of labour both in maternal and neonatal perspective. A significant increase in the incidence of spontaneous vaginal deliveries are achieved with the use of WHO Modified Partograph from 70.50% in the control group to 82.30% in the study group, reduction in the incidence of instrumental vaginal delivery from 11.70% in the control group to 8.5% in the study group and a significant reduction in the number of Caesarean sections from 17.80 % in the control group to 9.20% in the study group (p value<0.0001). The results of our study are comparable with that of many other studies. WHO Multicentric trial 1994[7] showed an increase in spontaneous deliveries from 74.3% to 78.3% following Partogram introduction. Javed *et al*. [8] reported increase in spontaneous deliveries from 78.4% to 88%, operative vaginal delivery from 8.8% to 5.6% and caesarean section from 12.8% to 6.4%. Md Alauddin *et al*. [9] found a reduction in normal deliveries from 71% to 83.8%, operative deliveries from 11% to 8.3%, and caesarean section rates from 18% to 8.88%. Divya S *et al*. [10] found a normal vaginal delivery rate of 83.8%, instrumental delivery in 8.2%, and caesarean section rate of 8% in study group.

However there was no difference found by Lavender T *et al*. [12] between partogram and no partogram in caesarean section (risk ratio (RR) 0.64, 95% confidence interval (CI) 0.24 to 1.70) or instrumental vaginal delivery (RR 1.00, 95% CI 0.85 to 1.17).

The most significant finding in the present study is the reduction in the total duration of labour, and reduction in the frequency of cases with total duration of labour more than 12 hours in the study group, as compared to the control group. The frequency of prolonged labour in our study is reduced from 15.0% among the control group to 3% among the study group, with none exceeding 16 hours. The findings are comparable to the study done by Iffat Javed, Shereen Bhutta, Tabassum Shoaib [8], who reported that introduction of partogram showed a significant impact on duration of labour with 91.6% of subjects delivered within 12 hours. Md Alauddin *et al*. [9] Reported that 95.5% of the patients delivered within 12 hours. Divya S *et al*. [10] Stated that 95.8% of cases delivered within 12 hours with only 4.2% cases having prolonged labour.

There was a significant reduction in the requirement of oxytocin augmentation in our study, from 29.20% among the controls to 15% among the study group. The results are comparable with the previous studies WHO Multicentric Trial [7], where oxytocin requirement was reduced significantly from 20.7% before implementation of partograph to 9.1% afterwards. According to Md Alauddin *et al*. [9], oxytocin requirement reduced from 28% to 9.44%. Similar results were obtained by Manjulatha *et al*. [11], requirement of oxytocin augmentation reduction from 29% to 16%, and Divya S *et al*. [10] 28% to 13.2%.

There was a significant reduction in the frequency of vaginal examinations following monitoring by partograph, which was comparable to previous studies done by Iffat Javed, Shereen Bhutta, Tabassum Shoaib [8], Divya S *et al.* [10].

The APGAR score at 1minute shows that the need of neonatal resuscitation dropped significantly from 9.20% in control group to 4.5% in study group. The results were similar to the study done by Iffat Javed, Shereen Bhutta and Tabassum Shoaib [8] where

it was reduced from 9.6% in controls to 4.2% among the study group. A reduction in the NICU admissions of the baby from 16.83% among the control group to 6.83% in the study group wa there, which was comparable to the previous studies done by S. Tayade *et al*. [13], Ahmed B *et al.* [14].

The frequency of Postpartum Haemorrhage among the control group was 3.8%, which came down to 0.7% among the study group, comparable to that of study done by Iffat Javed, Shereen Bhutta, Tabassum Shoaib [8] where reduction from 4.8% in the control group to 0% in the study group was found. In Md Alauddin's study [9], there was a reduction in the PPH from 6% in controls to 3.88% in the study group.

CONCLUSION

The Partograph is a simple graphical representation of the events in the progress of labour and enables relevant fetal and maternal parameters to be viewed at a glance in a single sheet of paper. It helps in early detection of any deviation in the normal progress of labour, allows early interventions thereby reducing the total duration of labour and improving the outcome of labour, both maternal and fetal. It provides a valuable guide as to when the progress of labour is slowing down so that labour augmentation can be done. It helps in assessing both maternal and fetal parameters thus aids in deciding an operative intervention in the form of caesarean section or instrumental delivery**.** Partograph of the patient gives an excellent idea about the progress of labour when referred from peripheral centres and hence it helps in appropriate decision to be taken at the tertiary health care centre. The partograph's role can be described as that of a watchful expectancy with the need to intervene when the circumstances necessitate. As reinforced by the findings in our study, the Partograph although being an old tool, is a golden tool in the modern obstetrics.

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