The Effect of Use of A Modified Type of Partogram on Cesarean Section Rates: A Randomized Controlled Clinical Trial

Mohammed Fawzi Abo Elkheir, Rafik Ibrahim Barakat,
Mohammed Alsayed Abdelhafez, Kholoud Almosad Gomaa Aldakdousy*
Department of Obstetrics and Gynecology, Faculty of Medicine - Mansoura University, Egypt
*Corresponding author: Kholoud Almosad Gomaa, **Mobile:** (+20) 01092421182, **E-Mail:** kholoudalmosad@gmail.com

ABSTRACT

Background: The partograph is an inexpensive tool designed to provide a continuous pictorial overview of labor and has been shown to improve outcomes when used to monitor and manage labor. It is a single sheet of paper which includes information about the fetus' heart rate, uterine contraction, any drugs used and other important factors that could help avoid extensive descriptive notes. The objective of the current study is to detect the value of use of modified type of partogram and comparing it with the classical type of partogram in reducing unindicated cesarean section rate, and to detect obstructed labor early to make earlier decision in management of labor.

Patients and methods: This randomized controlled clinical trial was carried out by simple random sampling using sealed envelopes technique. Partograms were conducted on 140 females with cervical dilatation less than 6 cm, single tone pregnancies, gestation of at least 37 completed weeks, cephalic presentation, and no reported use of oxytocin in the first stage of labor. Thereafter, they were divided into two groups according to the type of partogram used during labor monitoring as the following: Classic partogram with one hour two lines, and WHO 2007 modified type of partogram.

Results: Cesarean section rate is lower among group with modified type of partogram than classical one (2.9% versus 12.9%). Mean time of start active phase of labor was earlier and shorter time from entrance in the hospital till labor among group with classical than group with modified partogram.

Conclusion: Modified partogram lowered the incidence of cesarean section rate, compared with classical partogram. Also, mean time of start active phase of labor and duration from admission to delivery were shorter with modified partogram compared with classic partogram. Monitoring and audit of the partogram in practice, including completion, decision making and referral and outcomes, is recommended.

Keywords: Partogram, Modified Partogram, Cesarean Section, Pregnancy, Labor, Morbidity.

INTRODUCTION

The caesarean section (CS) rates have dramatically increased all over the world. However, there is no clear evidence of a simultaneous decrease in maternal or perinatal morbidity or mortality [1, 2]. The process of labor is associated with both maternal and fetal potential risks, regardless of the mode of delivery [3].

There are various CS indications that aim to reduce the maternal/fetal risks [4]. The economic aspect of labor is also of importance as an intrapartum cesarean section is significantly higher coast compared to a spontaneous vaginal delivery [5]. The use of the partogram reduces the risk of prolonged labor, un indicated cesarean sections, and perinatal mortality [6,7].

Partograph is a visual/graphical representation of related values or events over the course of labor. It is an important tool for managing labor. The first graphic assessment of progress of labor was designed by Friedman in 1954, and further improved by Philpot and Castle [8].

The partograph is an inexpensive tool designed to provide a continuous pictorial overview of labor and has been shown to improve outcomes when used to monitor and manage labor. It is a single sheet of paper which includes information about the fetus' heart rate, uterine contraction, any drugs used and other important factors that could help to avoid extensive descriptive notes [8].

It is a practical device to be employed in a busy labor room with many cases, but limited personnel to screen for abnormal labor. With its use, there is no need to record labor events repeatedly. It helps to predict deviation from normal progress of labor and supports timely and proven intervention. It also helps to facilitate responsibility to the person conducting labor [8].

The aim of this study was to detect the value of use of modified type of partogram and comparing it with the classical type of partogram in reducing unindicated cesarean section rate, and to detect obstructed labor early to make earlier decision in management of labor.

PATIENTS AND METHODS

This randomized controlled clinical trial was carried out on women who were attended Emergency Unit at Obstetric Gynecology Department, Mansoura University Hospital. The study was conducted from September 2019 to September 2020.

Inclusion criteria: Patients were early in labor, singleton pregnancies, gestation of at least 37 completed weeks, cephalic presentation, and no use of oxytocin in the first stage of labor.

Exclusion criteria: Non-cephalic presentation, multifetal pregnancies, any medical disorder with the patient (Hypertension, pulmonary embolism, DM), antepartum hemorrhage, post term pregnancies, any complicated labor, presence of rupture of membrane, evidence of ill fetal state, and women received epidural analgesia.

Sample size: Sample size calculation was based on

6.2% and 8.5% rates of cesarean section among cases with modified and classic partogram. Using G power to calculate difference between 2 proportions using Z test, 2 tailed, with alpha error =0.05 and power = 80.0%. The total calculated sample size was 64 in each intervention arm with adding 10% to avoid attrition then the total sample size was 70 in each group.

Methods:

During the study period, 350 patients early in labor in the surveillance room were attended by our team. Only 140 patients were selected according to the inclusion criteria to fulfil the estimated sample size. . Participants were divided into two groups:

- Group A had immediately admitted to start follow up in the latent phase; allocated to classical type partogram. Classic partogram, with two phases covers latent phase of labor up to 8 hours and active phase begin when cervix dilatation 3 cm with two lines alert line and action line. Cervical dilatation and head descent evaluated every one hour (Figure 1).

- Group B had delayed admission in active phase to start follow up in active phase as shown in the chart; allocated to modified type of partogram. Modified type of partogram was developed by WHO (2007) [9]. It is characterized by: Removal of latent phase; Beginning of active phase at 4 cm cervical; Alert line depending on cervical dilatation and fetal head descent; and Action line parallel to it but 4 hours to the right (Figure 2).
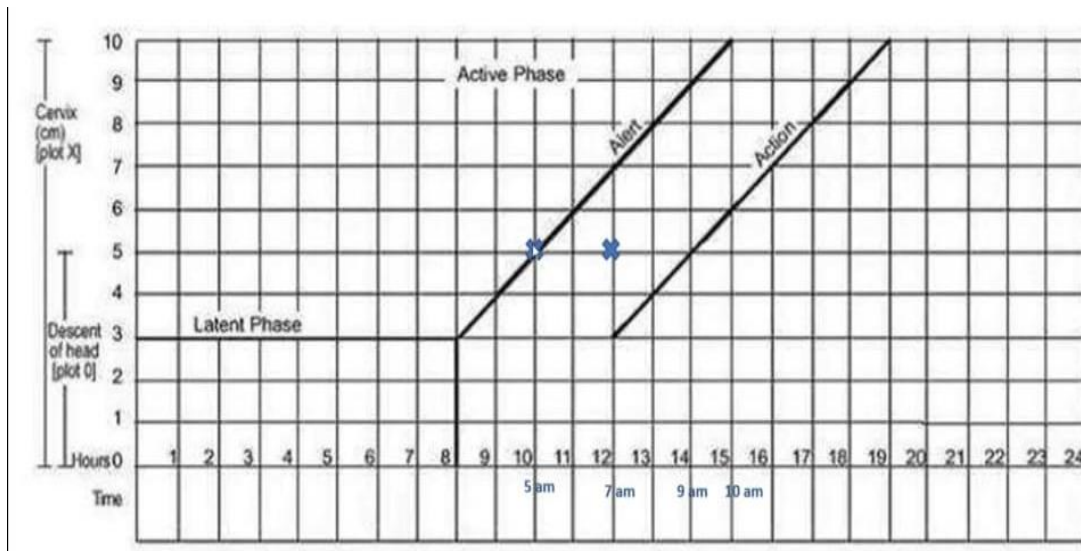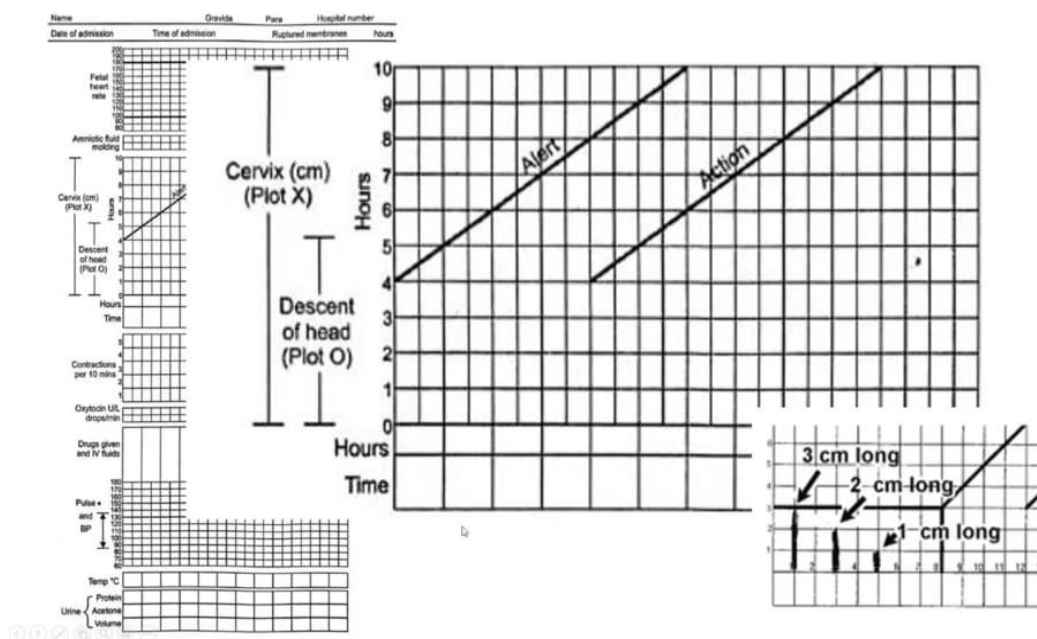

Figure (1): Classic partogram.

Figure (2): WHO 2007 modified type of partogram

Participants were assessed every hour till the end of labor. Assessment included early obstructed labor and early caesarean section. Comparisons were done between the two groups (group A versus Group B) regarding the results of assessment.
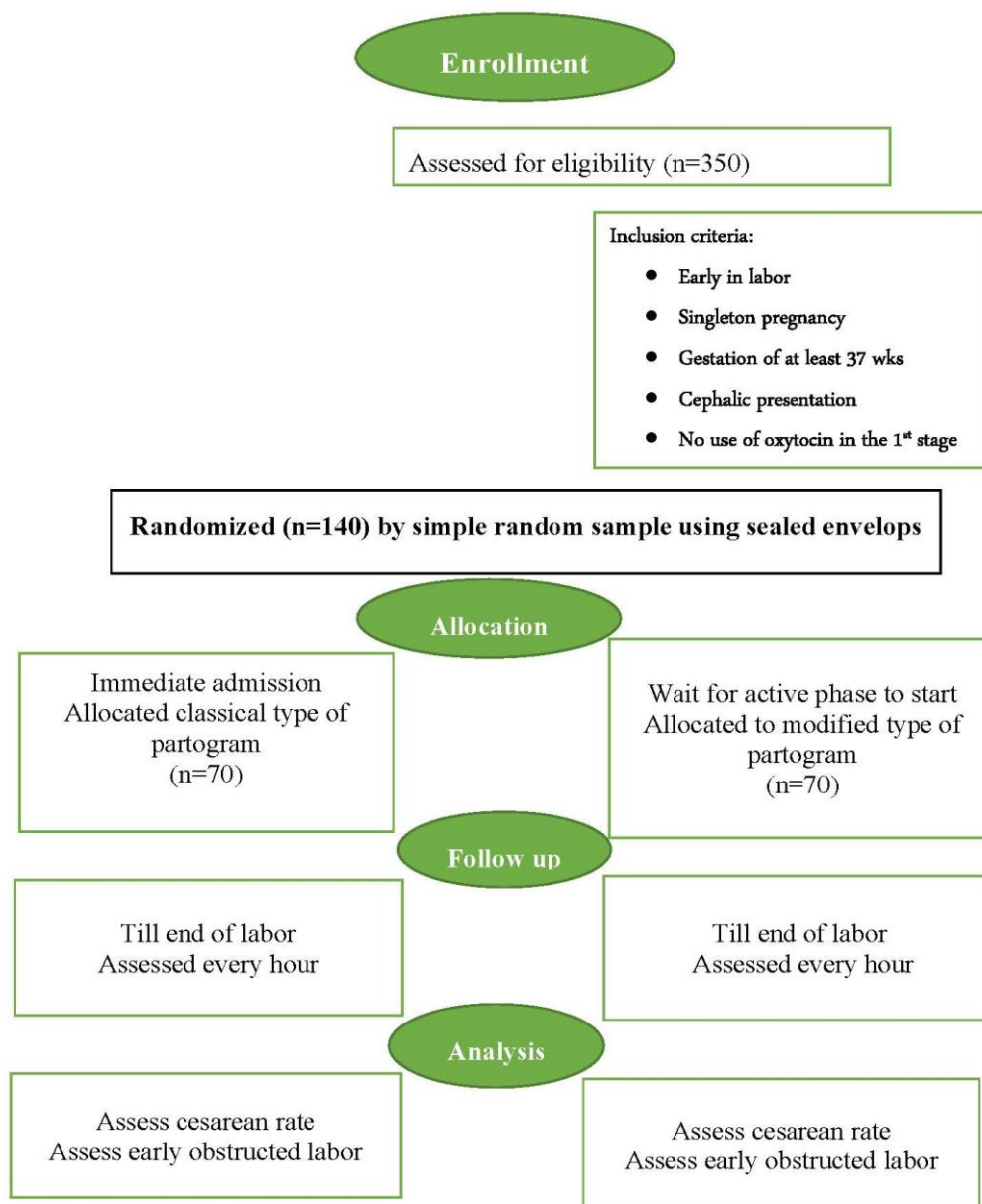
Figure (3): Study design follow up chart.

Ethical consent:

An approval of the study was obtained from **Mansoura University Academic and Ethical Committee. Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.**

Statistical analysis

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 22. Qualitative data was presented as number and percentage. Quantitative data was tested for normality by Kolmogorov-Smirnov test then described as mean and standard deviation for normally distributed data and median and range for non-parametric data. Chi-square test ($\chi2$) and Fisher's exact test to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean and standard deviation (SD). Independent samples Student's t-test/Mann Whitney U test was used to compare between two independent groups. P value < 0.05 was considered significant.

RESULTS

Table 1 shows that there was no statistically significant difference between studied groups regarding mother age and gestational age. Mean age of the studied mothers was 25.21(SD 5.87) years and 26.84 (SD 5.21) years for with classical partogram and modified type of portogram groups, respectively. Table 1 summarizes the sociodemographic characteristics of the 2 studied groups.

Table (1): Comparisons between the 2 studied groups regarding the socio-demographic characteristics of the participants.

Variable	Classical partogram N= 70	Modified type of partogram N= 70	Test of significance
Age/years Mean ± SD	25.21 ± 5.87	26.84 ± 5.21	t= 1.74 P-value 0.085
Residence Urban Rural	29 (41.4%) 41 (58.6%)	27 (38.6%) 43 (61.4%)	χ^2= 0.119 P-value 0.730
Educational level Illiterate Secondary University education	14 (20%) 27 (38.6%) 29 (41.4%)	19 (27.1%) 17 (24.3%) 34 (48.6%)	χ^2= 3.43 P-value 0.180
Occupation Housewife Manual worker Employee	14 (20%) 35 (50%) 21 (30%)	25 (35.7%) 27 (38.6%) 18 (25.7%)	χ^2= 4.37 P-value 0.113
Gravidity	2 (1-5)	2 (1-7)	z= 1.47 P-value 0.140
Parity	1 (0-4)	1 (0-4)	z= 1.38 P-value 0.167
Gestational age /weeks Mean ± SD	38.67 ± 1.09	38.86 ± 0.89	t= 1.09 P-value 0.138

t: Student t test. χ^2: Chi-square test.

Table 2 shows that there was no statistically significant difference between studied groups as regard vital signs (systolic, diastolic blood pressure, temperature and pulse rate).

Table (2): Comparison of vital rates between the 2 studied groups.

Variable	Classical partogram N= 70	Modified type of partogram N= 70	Test of significance
Systolic blood pressure	108.43 ± 8.45	109.29 ± 8.89	t= 0.584 P-value 0.560
Diastolic blood pressure	70.86 ± 5.03	72.0 ± 5.79	t= 1.25 P-value 0.215
Temperature	36.66 ± 1.19	36.88 ± 0.23	t= 1.52 P-value 0.132
Pulse	83.74 ± 4.35	82.89 ± 5.54	t= 1.02 p=0.310

t: Student t test. χ^2: Chi-square test.

Table 3 demonstrates that there was statistically significant difference between studied groups as regard rupture of membrane, duration from admission to delivery, mode of delivery and time to start active phase of labor and time elapsed from entrance in the hospital till labor. Mean time of start active phase of labor was earlier and shorter time from entrance in the hospital till labor among modified partogram group with modified than classic partogram group.

Table (3): Comparison of mode of delivery among studied groups.

Variable	Classical partogram N= 70	Modified type of partogram N= 70	Test of significance
ROM -ve +ve	42 (60%) 28 (40.0%)	53 (75.7%) 17 (24.3%)	χ^2=3.96 P-value 0.047*
Duration from admission to delivery/h Mean ± SD	10.50 ± 1.20	5.37 ± 1.18	t=25.47 P <0.001*
Mode of delivery Normal CS	61 (87.1%) 9 (12.9%)	68 (97.1%) 2 (2.9%)	χ^2=4.83 P-value 0.028*
Start of active phase – Labor Mean ± SD	393.94 ± 24.23	337.4 ± 29.20	t=12.47 P <0.001*
Time of entrance in the hospital – Labor Mean ± SD	494.77 ± 24.38	434.37 ± 24.49	t=14.62 P <0.001*

t:Student t test *statistically significant χ2=Chi-Square test

Table 4 shows that there was no statistically significant difference of fetal heart rate between the 2 studied groups.

Table (4): Comparison of Fetal heart rate among studied groups.

Variable	Classical partogram N= 70	Modified type of partogram N= 70	Test of significance
Fetal heart rate(b/min) Mean ± SD	135.14 ± 7.17	138.24 ± 6.68	t=1.139 P-value 0.257

Z: Mann Whitney U test t: Student t test *statistically significant

Table 5 shows that there is statistically significant higher doctor and patient satisfaction among group with modified partogram compared with classic partogram.

Table (5): Comparisons of patient and doctor satisfaction among studied groups

Variable	Classical partogram N= 70	Modified type of partogram N= 70	Test of significance
Patient satisfaction Not satisfied Satisfied	10 (14.3%) 60 (85.7%)	3 (4.3%) 67 (95.7%)	χ^2=4.15 P-value 0.04*
Doctor satisfaction Not satisfied Satisfied	5 (7.1%) 65 (92.9%)	0 70 (100%)	FET P-value 0.02*

FET"Fischer exact test, χ2=Chi-Square test

DISCUSSION

The aim of this study was to investigate the value of use of modified type of partogram comparing it with the classical type in reducing cesarean section rate.

This randomized controlled clinical trial was conducted on 140 females with cervical dilatation less than 6 cm, single tone pregnancies, gestation of at least 37 completed weeks, cephalic presentation, and no reported use of oxytocin in the first stage of labor.

In our study, as regard duration from admission to delivery was longer among group with classical partogram than with modified partogram. In consistent with our results, **Galazios et al.** [10] conducted a retrospective study to compare between the first classical WHO partogram (group A) and a new type (group B) in which they estimated and reported the sub of cervical dilatation and the position of the descending head. The study included 277 laboring, term, singleton, vertex deliveries in two academic institutions, the criteria for the enrollment included: singleton pregnancies, gestation of at least 37 completed weeks, vertex presentation, no use of oxytocin in the first stage of labor, Bishop Score below 6 and absence of additional abnormalities, complications or risk factors. it was noted that there was a statistically significant difference regarding the time of entrance in the hospital

to delivery between both groups, as it was longer in group A (512.00±16.61). Compared to group B (429.17 ± 15.34)

In agreement with our results, **Vlachos et al.** [11] conducted a retrospective study that included 478 term singleton uncomplicated pregnancies divided into two groups, where two types of partogram were used in labor monitoring. In the first group, the classical WHO partogram (A) was used. In the second group, a modified type of partogram, in which cervical dilatation and the position of descending head (B) were estimated and reported, was used. The labor duration and caesarean section rates were calculated and compared in the two groups. The study found that the time from entrance in the hospital to delivery was significantly shorter in group B than group A (P <0.001).

In the present study, mean time of start active phase of labor was earlier and shorter time from entrance in the hospital till labor among group with modified than group with classical partogram.

Galazios et al. [10] results were in line with our findings, as they demonstrated that there was a statistically significant early initiation in the acceleration stage of the active phase in the first phase of labor (dt1) (P <0.001, A: 108.73 ± 5.29 min, B: 69.96 ± 4.99 min) in patients who were studied with the modified partogram (B). Large recruited sample size can explain this variance.

In the present study, cesarean section rate is lower among group with modified type of partogram than classical type (2.9% versus 12.9%).

In consistent with our results, **Galazios et al.** [10] reported that caesarean section rate was lower in the modified type of partogram monitored group (10.25%) than the classical WHO partogram monitored group (18.69%) with P-value <0.001.

In our study, there was no statistically significant difference of fetal outcome between studied groups with median Apgar score was lower among group with classical partogram at 1 minute. Mean birth weight was 3841.43 and 3838.57 gm and fetal heart rate was 135.14 and 138.24 for group with classical and modified partogram, respectively.

Conforming to our findings, **Galazios et al.** [10] observed that the condition of the neonatal babies assessed by using the APGAR score was not statistically significant different the two partogram groups. Our results were in agreement with **Vlachos et al.** [11] who recorded APGAR scores at 1 and 5 minutes for neonates after labor and found them also similar between the two studied groups.

In the present study, there is no statistically significant difference between studied groups as regard patient and doctor satisfaction. Consistent with our result, **Lavender et al.** [12] carried out a randomized controlled clinical trial of prim gravid women with uncomplicated pregnancies, in spontaneous labor at term. Women were assigned to have their labors recorded on a partogram with an action line 2 or 4 hours to the right of the alert line. Primary outcomes were rate of cesarean delivery and maternal satisfaction. It was highlighted that there were no differences in women satisfied with labor experience.

LIMITATIONS
1. Although understanding and inferences of partogram can be drawn from the study, more than one aspect of partogram use, such as mechanism of use should be considered.
2. Partogram requires a skilled healthcare worker who can fill and interpret it.
3. Paper-partogram and the equipment required to complete it are unavailable in low resource settings.

CONCLUSION
Modified partogram lowered the incidence of cesarean section rate, compared with classical partogram. Also, mean time of start active phase of labor and duration from admission to delivery were shorter with modified partogram compared with classic partogram.

RECOMMENDATIONS
1. Further evidence from trials comparing partogram versus no partogram is needed.
2. The modified partogram is preferable to the composite partogram in terms of 'user friendliness'.
3. The partogram should be the main labor record, reducing unnecessary duplication of documentation.
4. There should be clear policy/guidance available at facility level for healthcare workers' reference.
5. Effective supervision by healthcare workers/managers with training and clinical experience in partogram use is necessary for sustaining successful implementation.
6. Regular training and updating should be provided for all healthcare workers using the partogram, using proven effective training techniques, e.g., multi-disciplinary, practical/clinical application. Training should include understanding of when to commence the partogram, decision making based on findings and understanding of role.
7. Monitoring and audit of the partogram in practice, including completion, decision making and referral and outcomes, is recommended.

study.

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