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The Relationship between a New Type of Partogram and Rate of Cesarean Section at Zagazig University

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ABSTRACT

Background: The cesarean section (CS) rates have dramatically increased worldwide. The process of labor is associated with both maternal and fetal potential risks, regardless of the mode of delivery. **Objective:** The aim of this study was to investigate the value of the use of a new type of partogram and compare it with Fisher partogram in reducing the cesarean section rates.

Patients and Methods: This cohort prospective study was carried out at the Department of Obstetrics and Gynecology, at Zagazig University Hospital and Menia Al-Kamh Central Hospital during the period study; year 2019. This study included 150 patients. We compared the efficacy of the two types of partograms during labor. **Results:** There were statistically significant differences between groups as regard newborns' Apgar at 5th min, and as regard cesarean section rate, which in Group (A) according to Fisher partogram was 6 (5.8%) and according to new type of partogram was 3 (2.9%) while in Group (B) according to Fisher partogram it was 23 (48.9%) and according to new type of partogram was 14 (29.8%). **Conclusions:** The new partogram is more helpful in the recognition of the initiation of the acceleration stage during the active phase of labor and in the timely use of appropriate actions in order to achieve a safer delivery.

Key words: Cesarean section rate, Labor, New type of partogram

INTRODUCTION

The worldwide increase in cesarean section (CS) rates is due to indications such as labor abnormalities, fetal distress maternal age, and parity, which are often over-diagnosed [(1)]. Previously, CS rates have dramatically increased worldwide. However, there is no clear evidence of a simultaneous decrease in maternal or perinatal morbidity or mortality [(2)]. The process of labor is associated with both maternal and fetal potential risks, regardless of the mode of delivery. There are various CS indications that aim to reduce the maternal/fetal risks. However, most of the cesarean deliveries are performed because of relative indications, according to which the maternal/fetal risks are thought to be relatively less in CS compared with vaginal delivery [(3)].

In the developing countries, prolonged labor is one of the most frequent causes of maternal mortality and is generally related to cephalopelvic disproportion and cervical dystocia [(4)]. An early detection of the abnormal progress of labor was shown to prevent prolonged labor; reduce the risk of postpartum hemorrhage; and eliminate the obstructed labor, uterine rupture, and perinatal fetal asphyxia cases and admissions to the intensive neonatal care unit [(5)].

The partogram is a graphic record of progress of labor and maternal and fetal condition during labor in a single sheet of paper which is useful in detecting the labor that is not progressing normally at an early stage and helpful in its management. The partograph graphically represents key events in labor and provides an early warning system. The World Health Organization (WHO) partographs are the best-known partographs in the low-resource setting. Partographs when used with defined management protocols is an inexpensive tool, which can effectively monitor labor and be helpful in reducing incidence of both maternal and fetal morbidity and mortality by reducing the number of operative interventions, prolonged labor, obstructed labor and cesarean section [(6)].

The modified WHO partograph is an inexpensive but valuable tool that provides a continuous pictorial overview of progress of labor. It helps to detect the abnormal progress of labor. It helps the obstetrician to decide about the need for augmentation of labor and helps to recognize prolong labor before obstruction occurs [(7)].

In the classical Fisher partogram, cervical dilatation and action line are the recorded parameters of the progress of labor. It consists of two straight diagonal parallel lines, where the action line is parallel and at the right of the alert line, but the fetal head descent is not included [(8)].

An early decision about the appropriate management to overcome the labor delay is possible with the use of the new type of partogram with only one graphic line [(9)]. Active management, opposed to expectant management, has reduced the prolonged labor incidence and the cesarean section rates. The documentation of the partogram includes the administration of oxytocin and procedures such as amniotomy [(10)].

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According to the findings of **Vlachos *et al.*** [11], the new type of partogram is a great tool in labor management. It contributes to the early detection of obstructed labor. In addition, compared with the classical partogram, it leads to earlier decision making in labor management and is shown to reduce the section rates.

The aim of the present study was to investigate the value of the use of a new type of partogram and compare it with Fisher partogram in reducing the cesarean section (CS) rates and to compare the efficacy of a new type of partogram versus classical Fisher partogram.

PATIANTS AND METHODS

This was a cohort prospective study carried out at the Department of Obstetrics and Gynecology, at Zagazig University Hospital and Menia Al-Kamh central Hospital during the period study; year 2019. This study included 150 patients. We compared the efficacy of the two types of partograms during labor.

The patients were divided into 2 groups: Group (A) included 103 patients, Fisher partogram was. Group (B) included 47 patients, new type of partogram, was used.

Inclusion criteria: Pregnant women aged between 20–35 years. Primigravida women with spontaneous conception. Pregnant women with singleton pregnancy. Gestational age between 38–41 weeks. Cephalic presentation. Pregnancy in active phase of labor, and cervical dilatation not more than 6 cm.

Exclusion criteria: Age <20 years or >35 years. Multigravida. Gestational age < 38 weeks and > 41weeks. Pregnant women with pregnancy induced hypertension. Post-term pregnancies. Malpresentation. Pregnancy with antepartum hemorrhage (APH). Pregnancy with gross cephalopelvic disproportion (CPD), hydramnios, prematurity, premature rupture of membrane (PROM), intrauterine growth restriction (IUGR), intrauterine death (IUD), multiple pregnancies, or contracted pelvis. Pregnancy with associated systematic diseases known to have effect upon course of labor like diabetes mellitus, heart diseases, asthma, hypertension, immune compromised status, severe anemia (Hb < 6 gm/dl) was excluded.

Ethical consent:

Written informed consent was obtained from all patients, the study was approved by the Research Ethical Committee of Faculty of Medicine, Zagazig University. The work was carried out for studies involving humans in accordance with the World Medical Association's Code of Ethics (Helsinki Declaration).

Method:

All selected participants were subjected to full detailed medical history was taken, complete clinical examination. The following laboratory investigations CBC, Kidney, Liver Function tests and Fasting and Postprandial Blood Sugar (FBS and PPS) were done for detection other medical problems that may need to be excluded from our study. Urine analysis for detection of proteinuria. Ultrasonographic examination by using AB 2-7 convex abdominal probe on Voluson 730 Pro Ultrasound Machine was done. Amniotic Fluid Index (AFI) was measured by placing the women in supine position. Uterine cavity was divided into 4 quadrants. In each quadrant the deepest, unobstructed, clear pocket of amniotic fluid was measured. The four measurements are added together and the sum represents the AFI.

The study population was divided into two groups according to the type of partogram used during labor monitoring. The two types of partograms used were as follows: 1) Fisher partogram, with one–hour two lines: cervical dilatation and actions line evaluated every one hour. 2) New type of partogram, with one line depending on three parameters, i.e., cervical dilatation, actions, and fetal head descent line.

The active phase of labor was defined as the time from the cervical dilation of ≥ 3 cm until complete cervical dilatation (10 cm) and characterized by the presence of painful regular contractions (every 5 min or less, lasting more than 20 sec) and a cervical dilatation rate of at least 1 cm/h. Patients were monitored in the labor room and progress of labor and the vital information was recorded in the Fisher partograph and new type of partograph.

Graphical recording was started when patient entered in active phase with no medication i.e. when cervix was 4 cm or more dilated. Per vaginal examination was performed at the time of admission to know the pelvic size, Bishop Score. Cervical finding was assessed 2 hourly by doing vaginal examination. Presence or absence of membrane, color of liquor, descent of the head and moulding of fetal skull were also recorded. Intensity and duration of uterine contraction were noted half hourly, fetal heart sound (FHS) recorded with the help of stethoscope, half hourly and monitored more frequently if found abnormal. Maternal blood pressure and temperature were recorded 2 hourly. Maternal pulse was recorded half hourly. Any medications and fluid intake given were noted.

The time of start of recording partograph was taken as 0 time. Alert and action line were made to assess progress of labor with four hours difference. Progress of labor labeled normal if the plotting of cervical dilatation remained on the alert line or to the left of it. The augmentation was decided according to the Bishop Score, strength and duration of uterine contraction. Augmentation was done either with surgical method, that is amniotomy (Artificial rupture of membranes "AROM") or with medical method, by using oxytocin. The augmentation was done with oxytocin infusion, whenever hypotonic uterine inertia would be diagnosed as the cause of delay in the progress of labor. Oxytocin infusion was expressed in terms of milliunit per minute. The drip was regulated manually, counting the drop

per minute. Oxytocin infusion was started with low dose 1–2 mU /min and escalated by 1–2 mU/min at every 30 min intervals up to 8 mu/min. Dose was titrated against the uterine contractions aimed for maximum of 3–4 contraction every 10 minutes lasting for 40–50 seconds. Adequate contractions was achieved up to the maximum dose of 16 mU /min. Maximum dose was not exceeded beyond the 32 mU /min. As a policy of active management of labor, AROM was done at or beyond 5 cm dilatation of cervix, even when course of labor was normal. Intramusculer injection of Drotin/epidosin was given to enhance the cervical dilatation in the active phase of labor. A maximum of 3 injections were given at an interval of half hour. Outlet forceps or vacuum was applied for prolonged second stage of labor (equal or more than 2 hours) and fetal distress. Cesarean section was performed whenever indicated (fetal distress, arrest of dilatation and descent, failed instrumental delivery) within partogram.

Follow up Doppler studies were performed if indicated to determine and monitor a favorable or worsening fetal wellbeing status. However only the results of last Doppler ultrasound within one week of delivery were used for analysis.

Statistical methods

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for the Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Wilk test. Qualitative data were represented as frequencies and relative percentages and were compared by Chi square test (χ^2). Quantitative data were expressed as mean ± SD (Standard deviation) and range. Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data) and Mann-Whitney test was used to compare between two independent groups of abnormally distributed variables (nonparametric data). P value < 0.05 was considered significant.

RESULTS

There was no statistically significant differences between groups as regard age and gestational age **(Table 1).**

Table (1): Comparison between two groups as regard to women's age and gestational age

	Group (A) (n=103)	Group (B) (n=47)	P Value
Age			
Min.-Max.	20-35	21-35	0.057
Mean± S.D	27.20±4.197	28.68±4.552	
Gestational Age			
Min.-Max.	38-41	38-41	0.705
Mean± S.D	39.47±1.139	39.39±1.059	

There was no statistically significant differences between groups as regard parity **(Table 2).**

Table (2): Comparison between two groups as regard to women's parity

Parity	Group (A) (n=103)		Group (B) (n=47)		P Value
	No.	%	No.	%	
Nulliparous	46	44.7	28	59.6	0.113
Multiparous	57	55.3	19	40.4	
Total	103	100	47	100	

There were no statistically significant differences between groups regarding hemoglobin (Hb) and platelets **(Table 3).**

Table (3): Comparison between the two studied groups according to blood picture

	Group (A) (n=103)	Group (B) (n=47)	P
Hb Level (g/dL) Mean± S.D	12.56±1.190	12.58±1.144	0.973
Platelets (X10^3) Mean± S.D	275.83±37.572	272.57±40.032	0.594

There were no statistically significant differences between groups regarding kidney function tests **(4)**.

Table (4): Comparison between the two studied groups according to kidney function tests

	Group (A) (n=103)	Group (B) (n=47)	P
Urea (mg/dl) Mean± S.D	13.70±4.129	13.10±4.475	0.591
Creatinine (mg/dl) Mean± S.D	0.85±0.260	0.87±0.249	0.698

There was statistically significant difference between groups as regard Apgar at 1st **(Table 5)**.

Table (5): Comparison between the two studied groups according to neonatal data

	Group (A) (n=103)	Group (B) (n=47)	P
Birth Weight (Mean± S.D)	3428.77±305.329	3328.21±374.131	0.084
Apgar at 1st min (Mean± S.D)	8.99±0.383	8.81±0.449	0.012*
Apgar at 5th min (Mean± S.D)	9.96±0.204	9.99±0.099	0.184

*: Significant

As regard time of entrance in the hospital – Labor, there was statistically significant difference between groups **(Table 6)**

Table (6): Comparison between the two studied groups according to time intervals

	Group (A) (n=103)	Group (B) (n=47)	P
Start of active phase –Labor			
Min.-Max.	315-417	322-402	0.055
Mean± S.D	346.65±17.838	353.30±18.825	
Time of entrance in the hospital – Labor			
Min.-Max.	393-516	397-571	0.009*
Mean± S.D	434.20±25.056	456.17±42.626	

*: Significant

There was statistically significant differences between groups as regard cesarean section rate according to Fisher and New type of partogram **(7)**

Table (7): Comparison between two groups as regard to women's cesarean section rate

Cesarean section rate	Group (A) (n=103)		Group (B) (n=47)		P Value
	No.	%	No.	%	
Fisher **partogram**	6	5.8	23	48.9	<0.001*
New type of partogram	3	2.9	14	29.8	<0.001*

*: Significant

Discussion:

Age in Group (A) ranged between 20-35 years with mean±S.D. 27.20±4.197 years while in Group (B) ranged between 21-35 years with mean±S.D. 28.68±4.552 years. There were no statistically significant differences between groups. Our results were supported by study of **Maged *et al.*** [12] as they reported that the mean age of the studied mothers was 26.82 ± 6.31years. Furthermore, **Ovayolu *et al.*** [13] reported that age did not significantly differ between the groups.

According to the Statement on Cesarean Section Rates released by the World Health Organization, population-based CS rates greater than 10% are not optimal. Although WHO has indicated that countries should not strive to achieve a specific rate, the rationale for the 10% recommendation is based on a systematic review and ecological analysis, which have shown that CS rates exceeding 10% are not correlated with reductions in maternal and newborn mortality. Instead high CS rates may increase maternal risks, adversely impact future pregnancies and overstretch health systems. According to a 2010 report, the global cost of excess CS is US$ 2.32 billion [14].

Reasons behind the global increase in CS are multifaceted and include both clinical and non-clinical factors. Changes in risk profiles of women, a purported rise in medical indications as well as non-medical reasons including social, cultural and economic factors underlie the increase in CS rates in many settings. Another factor implicated in the increase in CS rates is the "physician factor," which attributes the rise in CS not to obstetric risk factors, but to physician-related and institutional reasons [15].

The present study showed that gestational age in Group (A) ranged between 38-41 weeks with mean± S.D. 39.47±1.139 weeks, while in Group (B) it ranged between 38-41 weeks with mean± S.D. 39.39±1.059 weeks. There was no statistically significant difference between groups. Our results were in agreement with study of **Galazios *et al.*** **[9]** as they reported that the mean gestational age among Fisher group was 39.23 ± 0.86 weeks and the mean gestational age among new partogram group was 39.18 ± 0.87 with no statistically significant difference between both groups.

In study of **Rani *et al.*** **[16],** 44 out of 49 (89.8%) women with gestational age <40 weeks delivered vaginally while 24/28 (85.71%) women with gestational age >40 weeks delivered vaginally showing no statistically significant association between gestational age and mode of delivery. Similar trends were reported by **Hammoud *et al.*** **[17];** they observed that advanced gestational age was found to be associated with higher rates of failed trial of labor (TOL) and uterine rupture. In their study too the rate of cesarean section was higher amongst the higher gestational age group and followed the same trend**.**

The current study showed that parity in Group (A) was 46 (44.7%) with nulliparous and 57 (55.3%) with multiparous while in Group (B) 28 (59.6%) with nulliparous and 19 (40.4%) with multiparous. There were no statistically significant differences between groups where. Our results were in line with study of **Vlachos *et al.*** **[11]** as they reported that the partogram of 200 grand multipara women (mean 2 previous deliveries) were analyzed according to the Fisher partogram (total 69) and the new type of partogram (total 131) and were compared with the partogram of nulliparous women (total 278) who either had the Fisher partogram (total 112) or the new type of partogram (total 165). There were no statistically significant differences between groups. In the study of **Sinha *et al.*** **[18]**, it was found that most of the patients had an average parity of >5 (39%), followed by those having a parity of 3–4 (31.66%). Similarly, **Khodakarami *et al.*** **[19]**, demonstrated that about 50% of women had a history of at least three pregnancies.

Pregnancies associated with medical, surgical and obstetrical complications significantly affect maternal and fetal outcome. About 20–30 % pregnancies belong to this high risk group. Despite adequate antenatal and intranatal care, 70–80 % of perinatal mortality and morbidity occur in these pregnancies. Hence this group in addition to intensive antenatal care commands critical intranatal and neonatal care to improve the obstetric results further. Intrapartum care of such pregnancies for both spontaneous and induced labors for close monitoring should be preferably by continuous electronic fetal monitoring for fetal well-being and critically individualised for decision-making. However, for large population and financial constraints, this is not a routine practice in every setup of developing country. WHO endorses use of partogram as monitoring aid for intrapartum period in labor ward, as a part of safe motherhood programme (1994) for each pregnancy even in countries of third world **[8].**

Partogram is a simple and inexpensive printed paper version of continuous pictorial overview of labor record. This permits its easy use by both midwives and obstetrician. It has three distinct sections for recording maternal and fetal condition with labor progress. The labor progress assists in the detection of prolonged labor, which is an independent risk factor for fetal asphyxia, postpartum hemorrhage (PPH) and sepsis. Partogram also documents biochemical analysis of urine for protein and ketone and urine output versus administered intravenous fluid in labor, for critical fluid balance. It also records the drugs administered to the mother during course of labor. Partogram simultaneously gives an overview of all labor events and its progress like cervical examination, fetal heart rate along with observation of maternal health. It is useful in both low and high-risk laboring mothers however, since high risk pregnancies demand and command more closely monitoring, supportive care, and is more often associated with systemic or obstetric complications, it helps to anticipate and prepare for needful interventions like augmentation, cesarean section or even instrumentation **[20]**.

In the study in our hands, newborns' birth weight in Group (A) ranged between 2768-4331 gm with mean±S.D. 3428.77±305.329 gm while in Group (B) ranged between 2506-4156 gm with mean± S.D. 3328.21±374.131 gm. The difference was not significant. Newborns' Apgar at 1st min in Group (A) ranged between 8-10 with mean±S.D. 8.99±0.383 while in Group (B) ranged between 8-10 with mean± S.D. 8.81±0.449. There was statistically significant difference between groups. Newborns' Apgar at 5th min in Group (A) ranged between 9-10 with mean± S.D. 9.96±0.204 while in Group (B) ranged between 9-10 with mean± S.D. 9.99±0.099. There was no statistically significant difference between groups.

Our results were supported by study of **Sharma *et al.*** **[21]** as they reported that majority of subjects in both the groups had babies with birth weight >2500 gm. statistically there was no significant difference (p=0.772). However, in both the groups, majority of the babies had Apgar score of 7 or above at 1 minute. There was no statistically significant difference between the two groups. Furthermore, **Vlachos *et al.*** **[11]** revealed that the mean birth weight was similar in both groups (p=0.187). The condition of the neonates was assessed using the Apgar score because there were no facilities for cord blood sampling. Apgar scores at 1 and 5 min after labor recorded in all studied participants were also similar between the two groups (p=1.00) in the cesarean section group.

The partogram may be a useful tool in increasing the quality of all observations on the fetus and mother in labor. It may lead to early problem detection and has many potential benefits on the active management of labor. However, the use of a partogram is controversial, particularly in elective cesarean section cases, in which no advantages are observed because there is no labor. Active management, opposed to expectant management, has reduced the prolonged labor incidence and the cesarean section rates. The use of the partogram reduces the risk of prolonged labor, cesarean sections, and perinatal mortality. The documentation of the partogram includes the administration of oxytocin and procedures such as amniotomy [(10)].

In the classical Fisher partogram, cervical dilatation and action line are the recorded parameters of the progress of labor. It consists of two straight diagonal parallel lines, where the action line is parallel and at the right of the alert line, but the fetal head descent is not included. The alert line drawn from 3 cm to 10 cm represents the dilatation rate. The action line is drawn in the right of the alert line and shows if cervical dilatation is altered. It is known that cervical dilatation is a critical assessment and one of the main reasons of prolonged labor. In the new partogram under study, the alert line is crossed only once, and it is included as part of the single graphic line evaluation of labor progress. An early decision about the appropriate management to overcome the labor delay is possible with the use of the new type of partogram with only one graphic line. The wide variation in the published records of labor observation suggests that midwives and some obstetricians prioritized cervical dilatation over the other parameters [(8)].

The present study showed that women's start of active phase – Labor in Group (A) ranged between 315-417 min with mean±S.D. 346.65±17.838 min while in Group (B) ranged between 322-402 min with mean±S.D. 353.30±18.825 min. There was no statistically significant differences between groups. Women's time of entrance in the hospital – Labor in Group (A) ranged between 393-516 min with mean±S.D. 434.20±25.056 min while in Group (B) ranged between 397-571 min with mean±S.D. 456.17±42.626 min. There was statistically significant differences between groups where P=0.009.

In the study of **Galazios *et al.*** [(9)], they found that there is a shorter duration of acceleration in the active phase (first stage of labor) of the new type partogram (B). In cases using partogram B, dt (2) was 91.89 ± 4.04 min versus 136.93 ± 4.79 in cases using partogram A; p50.001, 32.48 to 57.60 (95% confidence interval [CI] of the difference). Engagement of fetal head led to a shorter duration of the alert line [dt (2)] and influenced the course of labor. Based on their findings, they confirmed in the second group a statistically significant decrease in the duration between the initiation of active phase of labor and the delivery time [dt(1)] + [dt(2)] + [dt(3)] in cases where the labor progress was evaluated according to the new type partogram B. Partogram A was 318.40 ± 10.40 min versus 246.56 ± 8.28, respectively [p50.001, 45.52 to 98.17 (95% CI of the difference)]. Since these differences appear to be clinically significant, their suboptimal documentation, especially that of the fetal head descent, hinders early detection of labor progress deviation, timely intervention of labor modus and prevention of obstetric complications. Failure of descent of the presenting part during the first stage of labor in addition to arrest of cervical dilatation was associated with a high cesarean section rate. This contributes to the support of multifactorial redefinition of labor curves, which are used widely in the management of labor.

According to **Sharma *et al.*** [(21)], non-progress of labor, acute fetal distress and breech were the common indications for LSCS in previous delivery in both the groups. Statistically there was no significant difference between two groups (p=0.364). In Group B, the indication of non-progress of labor (NPL) and acute fetal distress (AFD) was significantly higher as compared to Group A (p<0.001).

Rani *et al.* [(16)] demonstrated that no significant difference was found in mean duration of active phase of first stage of labor between two groups.

In the study of **Sanghvi *et al.*** [(22)], they compared data from 842 clients in active labor using ePartograms with data from 1,042 clients monitored using a paper partograph. SBAs (Skilled birth attendants) using ePartograms were more likely than those using paper partographs to take action to maintain normal labor, such as ambulation, feeding, and fluid intake, and to address abnormal measurements of fetal well-being (14.7% versus 5.3%, adjusted relative risk=4.00, 95% confidence interval [CI]=1.95–8.19). Use of the ePartogram was associated with a 56% (95% CI=27%–73%) lower likelihood of suboptimal fetal outcomes than the paper partograph. Users of the ePartogram were more likely to be compliant with routine labor observations. The study, conducted in Kenya from October 2016 to May 2017, allocated 12 hospitals and health centers to an intervention (ePartogram) or comparison (paper partograph) group.

The current study showed that cesarean section rate in Group (A) according to Fisher partogram was 6 (5.8%) and cesarean section rate according to new type of partogram was 3 (2.9%) while in Group (B) cesarean section rate according to Fisher partogram was 23 (48.9%) and cesarean section rate according to new type of partogram was 14 (29.8%). There were statistically significant differences between groups.

Sharma *et al.* [(21)] reported that the incidence of a repeat cesarean section was increased if despite augmentation with amniotomy and oxytocin labor curve crossed the action line.

In the study of **Vlachos *et al.*** [(11)], the maternity records were checked retrospectively: 340 women (71.2%) had spontaneous vaginal deliveries and 138 women (28.8%) underwent emergency CS. The full-term pregnancies were normal, and the vaginal deliveries were spontaneous and non-instrumental. In total, 171 nulliparous and 169 multiparous women had a normal vaginal delivery, whereas 107 nulliparous and 31 multiparous women underwent CS.

Lavender *et al.* **[23]** demonstrated that partograph with alert line only versus partograph with alert and action line (1 trial, 694 women), the cesarean section rate was lower in the alert line only group (RR 0.68, 95% CI 0.50 to 0.93). There were no clear differences between groups for oxytocin augmentation, low Apgar score, instrumental vaginal birth and perinatal death.

According to **Wondie *et al.*** **[24]**, a total of 512 mothers were included in the final analysis (response rate = 98.4%), the prevalence of cesarean delivery was found to be 47.6% (95% CI: 44.3, 51.1), while 46 (18.2%) of the procedure conducted in public and 198 (76.1%) were in private hospitals. Partograph monitoring [Adjusted odds ratio [AOR] = 3.84 95% CI: 2.24, 6.59], oxytocin administration [AOR = 4. 80 95% CI: 2.87–8.02], previous cesarean delivery [AOR = 2. 86 95% CI: 1.64–5.01] and place of delivery being a private hospital [AOR = 6. 79 95% CI: 4.18–11.01)] were associated with cesarean delivery.

CONCLUSIONS

The new partogram is more helpful in the recognition of the initiation of the acceleration stage during the active phase of labor and in the timely use of appropriate actions in order to achieve a safer delivery.

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