

## Research Article

### COMPARISON OF FRIEDMAN CURVE AND WHO PARTOGRAPH IN MONITORING LABOR

<sup>1\*</sup> I Gde Sastra Winata, <sup>1</sup>William Alexander Setiawan, <sup>2</sup>Kardi Rahayu, <sup>2</sup>Made Refika Widya Apsari Tangkas, <sup>1</sup>I Gusti Agung Angga Wijaya

<sup>1</sup>Obstetrics and Gynecology Department, Prof. Dr. I.G.N.G. Ngoerah Hospital/Medical Faculty of Udayana University, Bali, Indonesia.

<sup>2</sup>Faculty of Medicine Udayana University, Bali, Indonesia.

Received 16<sup>th</sup> August 2022; Accepted 17<sup>th</sup> September 2022; Published online 31<sup>st</sup> October 2022

#### ABSTRACT

In developing countries, prolonged and obstructed labor is one of the main causes of maternal and fetal morbidity and mortality. This is influenced by power, passage, and passenger. Therefore, it is important not only to identify the causes of prolonged labor, but also to take timely steps to prevent and manage prolonged labor. Friedman curve and World Health Organization (WHO) partograph are simple monitoring tools that show the progress of labor and the condition of the mother and fetus during labor. It helps to identify delays in labor progress and signs of maternal or fetal distress easily so that early intervention can be taken. The Friedman curve later became the basis of the WHO partograph in clinical use today. There are several differences between these two monitoring tools which will be discussed further in this study.

**Keywords:** comparison, Friedman curve, labor monitoring, WHO partograph.

#### INTRODUCTION

Labor is process which products of conception is expelled from uterus.<sup>1,2</sup> Although it is a physiological process, labor can be very dangerous event and associated with high morbidity and mortality for both mother and fetus. Therefore, monitoring of labor is useful for detection of problem during labor and prevention of obstructed labor that leads to morbidity and mortality of patients. The partograph is one of tools that can be used to monitor first stage of labor. It is an inexpensive tool that has been shown to improve outcomes when used to monitor and manage labour.<sup>3</sup> The partograph has different variables (fetal heart rate, dilation of the cervix, contractions, and pulse rate of the mother) plotted on pre-printed paper.<sup>4</sup> Partograph use is recommended for routine monitoring of labor, and helps the health care provider in identifying slow progress in labor, and may help initiate appropriate interventions to prevent prolonged and obstructed labour.<sup>5</sup> The WHO advocates its use as a necessary tool in the management of labor and recommends its universal use during labor.<sup>4</sup> In addition to the partograph, there are several other tools that can be used to monitor the labor process. One of them is the Friedman curve. Friedman curve is gold standard graph for recording labor progress or the duration of time in the first stage of labor and it is used to identify potential of a safe vaginal delivery, developed by Emanuel A. Friedman.<sup>6</sup> In Indonesia, partograph is more commonly used, but in some other countries including Thailand they use Friedman curve to assess progression of labor. According to history of partograph, Friedman curve was first model of partograph introduced in 1955.<sup>7,8</sup> The curve was then modified and added variables that could make it easier for healthcare provider (midwives) to monitor labor. In 1994, WHO revised and approved the modified partograph to be used globally in all labor ward.<sup>8</sup> The partograph and the Friedman curve have several differences in monitoring a labor.

process. Both have their own advantages and disadvantages. Therefore, in this study we will discuss the differences between the use of the WHO partograph and the Friedman curve in monitoring labor.

#### FRIEDMAN CURVE

The concept of partograph was firstly introduced by Emanuel Friedman. In the study conducted in 1954, he tried to explain relation of cervical dilatation to the number of hours in the first stage of labor. The study was basically aimed to assess the progression of labor and identify whether the delivery is safety or not. In the study, Friedman recorded cervical dilation of 100 nullipara women with term pregnancy who come to the hospital in early-stage of labor.<sup>8,9</sup> In 1955, Friedman published his second study of 500 women. The study resulted 2 functional phases in first stage of labor such as latent phase and active phase.<sup>7,8</sup> The active phase consists of 3 phase including acceleration phase, phase of maximum slope and deceleration phase. Latent phase lasts 8-10 hours from cervical effacement to approximately 2.5 centimeters (cm) cervical dilation, while the active phase occurs during 2,5 cm to complete cervical dilatation. In active phase, there's condition called acceleration phase where slope of the curve rapidly changes and cervix continue to dilate. It is then followed by phase of maximum slope when cervical dilation change rapidly and the curve reach the maximum slope. Lastly, deceleration phase begins when the progress slow down between nine cm and ten cmin cervical dilatation. In Friedman curve, variables are observed during labor consist of fetal decent, cervical dilation and effacement. The variables were monitored by doing serial cervical examination every 2 hours.<sup>8,10</sup>

\*Corresponding Author: I Gde Sastra Winata,

1Obstetrics and Gynecology Department, Prof. Dr. I.G.N.G. Ngoerah Hospital/Medical Faculty of Udayana University, Bali, Indonesia.

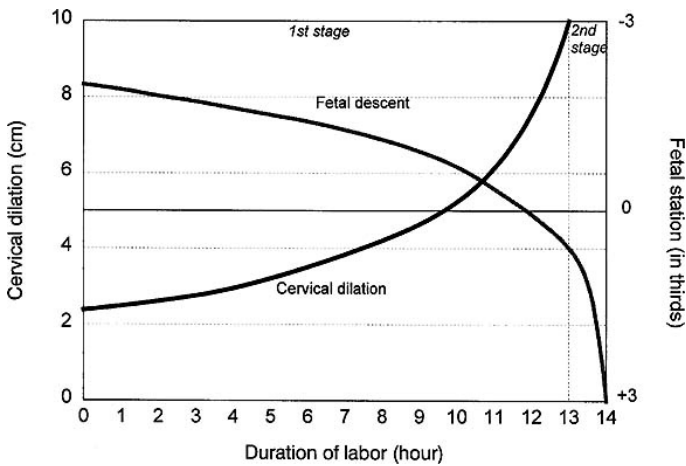


Fig. 2 Friedman Curve<sup>6</sup>

The curve is then modified by Philpot in his study in Zimbabwe by adding more variables including details of intrapartum. He also added an alert and action line to identify prolonged labor and giving early intervention without the need of unnecessary abdominal delivery.<sup>8,11</sup> WHO then revised and approved the partograph to be used in all labor wards.

**WHO PARTOGRAPH**

The partograph was globally adopted, and has been used as part of the assessment of labor progress for nearly half a century. It was recommended by the World Health Organization (WHO) in the 1988 following the launch of worldwide safe motherhood initiative.<sup>12</sup> The next development, in 2000 the WHO partograph was modified, to be simpler and easier to use. Where in the modified partograph, the latent phase is removed and the drawing of the partograph starts from the active phase, at 4 cm cervical dilatation.<sup>13</sup> The central feature is a graph used to record the progress of cervical dilatation, as determined by vaginal examination. We begin to fill the graph at 4 cm of dilatation or at active phase, and 3 contractions every 10 minutes. In certain situations, e.g., induction of labor, it is started at 4 cm of dilatation. There are several indicators that need to be checked including maternal and fetal indicators. Maternal indicators include: vital sign, time of spontaneous rupture of membranes, uterine contractions, urine output and drug administered and postpartum maternal monitoring. Fetal indicators include: fetal heart rate, amniotic fluid (color, odor and quantity), descent of the fetal head and head moulding<sup>14</sup> The WHO Partograph has two lines, the alert line and the action line. In normal labor during the active phase, plotting of cervical dilatation will remain on the left of or on the alert line. If it moves to the right of the alert line, labor may be prolonged. In this situation, transfer the patient if facility for emergency intervention is not available. Transfer allows adequate time for assessment or intervention till she reaches the action line. Action line is 4 hours to the right of alert line. Assess the cause of slow progress, and take necessary action. Action should be taken in a place where facility for dealing with obstetric emergencies is available.<sup>14</sup>

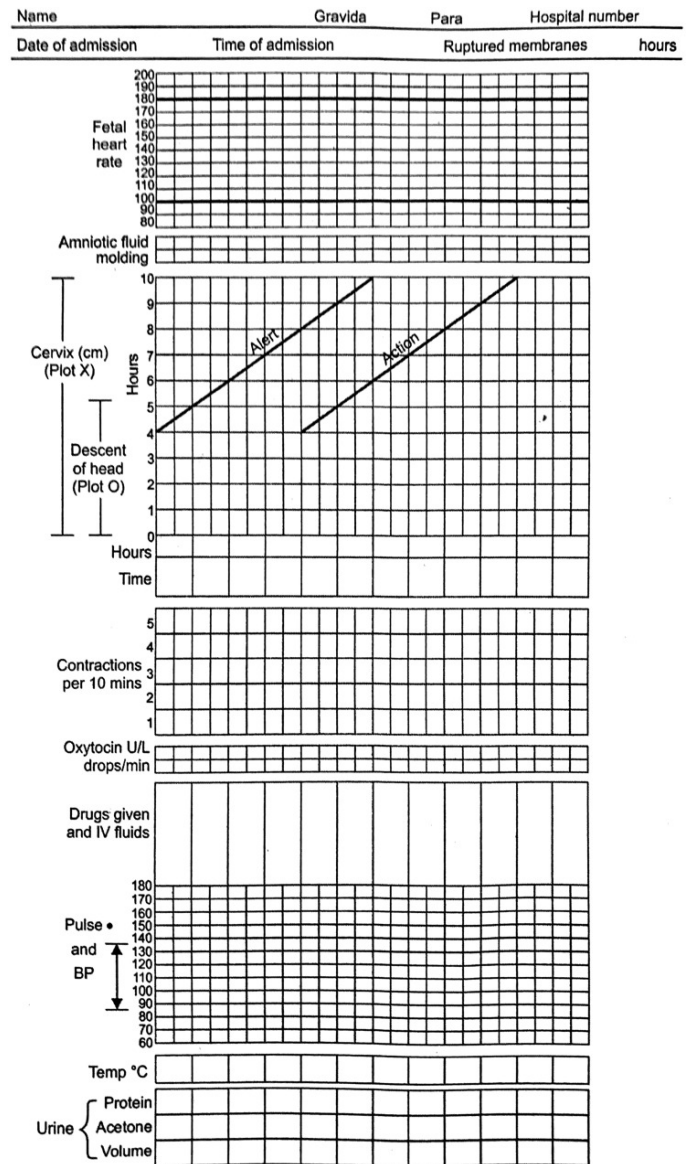


Fig. 2 WHO Modified Partograph 2000<sup>14</sup>

**COMPARISON OF FRIEDMAN CURVE AND WHO PARTOGRAPH**

Both Friedman Curve and WHO Partograph are tools for monitoring labor especially in first stage of labor. Friedman curve describe first stage of labor consists of latent phase and active phase. The starting point of the curve is the onset of latent phase, namely at 0 cm cervical dilatation. but the starting point changed to 2 cm in 1978 because some women have a completely closed cervix, spontaneous onset of labor, and a normal vaginal delivery within averagely 12 hours.<sup>10,15</sup> Meanwhile, the starting point WHO partograph is onset of active phase which is at 4 cm dilatation.<sup>14</sup> Cervical examination is routinely done in order to determine fetal descent and cervical dilatation. The examination is usually done every 2 hours in Friedman Curve and every 4 hours in WHO partograph.<sup>10,14</sup> Each of partographs has different method to monitor the progression of labor especially in determining fetal decent. Friedman curve used fetal station while WHO partograph using palpation method with term of fifths to determine the position of fetal head.<sup>6,14,16</sup> Friedman curve only documents the progression of labor. Meanwhile, the WHO partograph also documents labor in detail by regularly checking fetal and maternal status. Apart from that, WHO partograph is also equipped with some additional features such as alert line and action line. This line is really beneficial to professional who help the labor to initially

transfer the patient in order to give early treatment to slow progressing patient.<sup>8,16</sup>

## SUMMARY

Partograph is simple pictorial overview to describe the labor process. Two common partograph commonly used to monitor the labor are Friedman curve and WHO partograph. Friedman curve requires long time to monitor the labor due to starting point is in latent phase, meanwhile WHO partograph starts to be plotted in active phase. WHO partograph is not only assessing the progress of labor but also the status of the mother and fetus. It is also equipped with an alert line and an action line to prevent late management of patient. Based on the study, it shows that the WHO partograph is easier, simpler and more efficient partograph in monitoring births.

## REFERENCES

1. Norwitz ER, Robinson JN, Repke JT. Labor and delivery. Gabbe SG, Niebyl JR, Simpson JL, eds. Obstetrics: Normal and problem pregnancies. 3rd ed. New York: Churchill Livingstone; 2003.
2. McEvoy, Austin, and Maggie Tetrokalashvili. Physiology, Pregnancy Contractions. 2018.
3. Magon N: Partograph revisited. Int J Clin Cases Investig. 2011, 3: 1-2.
4. Dalai D. Comparison of procedure and predictability between WHO partogram and Paperless Partogram. Journal of Medical Science And clinical Research. 2019;7(7).
5. World Health Organization: Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice. 2006, Geneva: World Health Organization
6. Zhang J, Troendle JF, Yancey MK. Reassessing the labor curve in nulliparous women. American journal of obstetrics and gynecology. 2002 Oct 1;187(4):824-8.
7. Friedman EA. The graphic analysis of labor. American Journal of Obstetrics &Gynecology. 1954 Dec 1;68(6):1568-75.
8. Lavender T, Bernitz S. Use of the partograph-Current thinking. Best Practice & Research Clinical Obstetrics & Gynaecology. 2020 Mar 26.
9. Friedman EA. A graphicostatistical analysis. Obstetrics &Gynecology. 1956 Dec 1;8(6):691-703.
10. Zhang J, Troendle J, Grantz K, Reddy U. Statistical aspects of modeling the labor curve. American Journal of Obstetrics and Gynecology. 2015;212(6):750.e1-750.e4.
11. WHO partograph cuts complications of labor and childbirth. Safe Mother. 1994;(15):10.
12. EngidaYisma B. D., AyalewAstatkie and NebreedFesseha. Knowledge and utilization of partograph among obstetric care givers in public health institutions of Addis Ababa, Ethiopia. 2013. BMC Pregnancy and Childbirth, 13
13. Médecins Sans Frontières. Essential obstetric and newborn care. 2019 Edition.
14. Dalal A, Purandare A. The Partograph in Childbirth: An Absolute Essentiality or a Mere Exercise?. The Journal of Obstetrics and Gynecology of India. 2017;68(1):3-14.
15. Friedman EA. Labor: clinical evaluation and management. 2nded. New York (NY): Appleton-Century-Crofts; 1978
16. World Health Organization. The Partograph: the application of the WHO partograph in the management of labour, report of a WHO multicentre study, 1990-1991. World Health Organization; 1994.

\*\*\*\*\*