Comparison Between WHO Partograph and Friedman Curve in Diagnosing Labor Dystocia

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Abstract

Objective: This study aims to determine the importance of appropriate device selection and training in optimizing delivery outcomes and reducing the incidence of cesarean delivery.

Methods: The method used in this research is a literature review using three databases: PubMed, NCBI, and Google Scholar, covering publications from 2014 to 2024. A total of 19 articles were included after screening.

Results: Labor dystocia is characterized by slow progress of labor. It is the leading cause of unplanned cesarean delivery. The WHO Partograph, recognized for its flexibility and real-time monitoring capabilities, enables early detection of complications and helps reduce unnecessary interventions. Conversely, the Friedman Curve provides a more rigid temporal framework, which may lead to overdiagnosis and higher cesarean delivery rates.

Conclusion: While both tools are beneficial, the WHO Partograph demonstrates greater adaptability and effectiveness in managing labor dystocia, particularly in varied clinical environments.

Keywords: Friedmann Curve, Labor dystocia, WHO Partograph

Perbandingan Antara Partograf WHO dan Kurva Friedman dalam Diagnosis *Labor Dystocia*

Abstrak

Tujuan: Penelitian ini bertujuan untuk mengetahui pentingnya pemilihan alat yang tepat dan pelatihan untuk mengoptimalkan hasil persalinan dan mengurangi kejadian persalinan sesar.

Metode: Metode yang digunakan dalam penelitian ini yaitu tinjauan literatur dengan menggunakan tiga *database* yaitu PubMed, NCBI, dan Google Scholar. Dengan rentang waktu pencarian selama 10 tahun terakhir yaitu tahun 2014 hingga tahun 2024. Setelah dilakukan skrining, terdapat 19 artikel yang digunakan dalam penelitian ini

Hasil: Persalinan macet (*Labor dystocia*) ditandai dengan kemajuan persalinan yang lambat. Hal ini merupakan penyebab utama persalinan sesar yang tidak direncanakan. Partograf WHO, yang dikenal dengan fleksibilitas dan pemantauan waktu yang nyata, memungkinkan deteksi dini komplikasi dan mengurangi intervensi yang tidak perlu. Sebaliknya, Kurva Friedman memberikan kerangka kerja temporal yang lebih kaku, yang dapat menyebabkan overdiagnosis dan peningkatan angka persalinan sesar.

Kesimpulan: Meskipun kedua alat tersebut berharga, Partograf WHO menunjukkan kemampuan beradaptasi dan efektivitas yang lebih besar dalam mengelola distosia persalinan, terutama dalam pengaturan klinis yang beragam.

Kata kunci: Kurva Friedmann, Persalinan macet, Partograf WHO

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Introduction

Labor dystocia, which refers to slow progress during labor, is a common cause of unplanned cesarean deliveries. It is the primary reason for medical interventions during childbirth and is also known by various terms such as prolonged labor, difficult labor, dysfunctional labor, failure to progress, cephalopelvic disproportion (CPD), and obstructed labor.[1] The prevalence of dystocia varies with age it is 3.01% in women under 20, 2.03% in those between 20 and 30, and 5.02% in women between 30 and 50. The occurrence of dystocia is 50.03% in nulliparous women. Dystocia can be identified during the active phase of the first stage of labor or the second stage, which includes both the descending (or passive) phase and the expulsive (or bearing down/pushing) phase.Cesarean sections carry notable risks compared to vaginal births, which offer several significant benefits for both mother and baby. Vaginal birth helps reduce postpartum pain, fosters bonding between mother and baby, supports breastfeeding, and lowers the risk of childhood conditions. In contrast, cesarean surgery increases the likelihood of surgical complications, infections, and future pregnancy-related complications. Early diagnosis and management of labor dystocia are crucial for preventing unplanned cesarean sections. The success of managing labor dystocia largely depends on the diagnostic tool employed.[2]

In 1954, Friedman conducted a study on the rate of cervical change during natural labor and developed labor curves based on the data he collected. These curves represented the expected rate of cervical change in the general population. Deviations from these curves, especially if cervical change occurs more slowly than expected, are termed protracted or arrest disorders, indicating labor dystocia. The Friedman curve has since become a widely used tool for diagnosing abnormal labor. The partograph, an internationally recommended tool by the World Health Organization (WHO, is used to record clinical observations during labor, including the results of serial vaginal exams.[3]

Developed in the 1970s in Zimbabwe, the partograph was based on research from the 1950s. It features two linesthe alert line and the action. The partograph begins at a cervical dilation of four centimeters (indicating the onset of active labor) and assumes a rate of one centimeter per hour, historically considered the minimum rate for regular progress. These lines act as visual indicators: if cervical dilation crosses the alert line, the woman is transferred from a community setting to a facility equipped for augmentation and cesarean section (CS). Crossing the action line indicates labor dystocia, prompting the initiation of a management plan. Although the original WHO study demonstrated improved labor and birth outcomes in low-resource settings when the partograph was used with intensive training, recent reviews in high-resource settings have not shown significant benefits from its use.[3]

In 2000, the WHO Partograph was modified to enhance its simplicity and ease of use. The modified version eliminates the latent phase and begins from the active phase when the cervix is dilated to 4 cm. Partographs are used to assess labor progress and identify the need for interventions.[1]

This article aims to enhance readers' understanding of labor dystocia and broaden their perspective on diagnosing and managing this condition using the Friedman curve and the WHO partograph.

Method

This study employed a literature review method to compare the use of the WHO partograph and the Friedman curve in diagnosing labor dystocia. Literature searches were conducted across several major scientific databases, including PubMed, NCBI, and Google Scholar. The keywords

used in the literature search included "WHO Partograph," "Friedman Curve," "Labor Dystocia," "Labor Progression," and "Obstetric Management." The literature selection process wasbased on predefined inclusion and exclusion criteria. Inclusion criteria were journals specifically discussing the WHO partograph or Friedman curve in the context of labor dystocia, journals available in online versions, research journals, or review articles published within the last ten years (2014 to 2024). Exclusion criteria included journals that did not contain information related to the main keywords, journals without an ISSN, and journals published more than ten years ago.

After screening, a total of 45 scientific articles were identified. Of these, 19 articles met the inclusion criteria and were selected as primary references for writing this review. A comparison between the WHO partograph and the Friedman curve was conducted, considering the effectiveness of each method in diagnosing labor dystocia, their impact on labor management, and clinical outcomes.

Result

Anantasika et al. argued that monitoring labor using the WHO partograph and the Friedman curve during the active phase of labor showed no statistically significant differences ($p > 0.05$). However, in cases where the Friedman curve was used, there was a significant association with cesarean delivery ($p= 0.027$). Additionally, labor monitoring using the Friedman curve was positively correlated with the administration of oxytocin compared to monitoring with the WHO partograph ($p= 0.026$).[4]

Rozsa et al. (2022) investigated the impact of applying Zhang's guideline versus the WHO partograph on the childbirth experience, measured using the Childbirth Experience Questionnaire (CEQ), in a cluster-randomized trial. Although no significant differences were found in total CEQ scores or domain scores between the two groups, statistically significant differences were observed in two individual items. Women in the Zhang group reported lower positive memories and a reduced sense of control compared to the WHO group. These findings suggest that while both approaches are equivalent in overall outcomes, certain aspects of the childbirth experience may be negatively affected by Zhang's guidelines.

Criticisms of this study include a lack of in-depth analysis regarding why these differences emerged and whether factors such as intrapartum interventions or emotional support contributed to the results. Therefore, the study's findings do not support a preference for Zhang's guideline over the WHO partograph, highlighting the need for further evaluation of the psychosocial impacts of different approaches in labor management.[5]

Discussion

Overview of Dystocia

Abnormally prolonged labor, or labor dystocia, is a common complication during parturition. It is the indication for about half of unplanned cesarean deliveries in low-risk nulliparous women.[6] The concept of shoulder dystocia has been documented for over two centuries. It is characterized by the anterior shoulder becoming wedged behind the pubic symphysis after the birth of the fetal head. This situation arises when the biacromial diameter exceeds the pelvic diameter. Shoulder dystocia is identified by the need for further obstetric interventions to facilitate the delivery of the fetal shoulders during vaginal childbirth, as standard gentle downward traction applied to the head proves insufficient to deliver the anterior shoulder.[7]

Several key risk factors for shoulder dystocia include macrosomia, which is the most significant, particularly for

babies weighing 4000 grams or more. Diabetes mellitus also increases the risk due to the tendency for larger babies with disproportionate fat distribution. Operative vaginal delivery, especially when combined with macrosomia, significantly raises the risk. A history of previous shoulder dystocia dramatically increases the likelihood of recurrence. Maternal obesity or excessive weight gain may also contribute, though its independent impact is unclear due to its association with diabetes and macrosomia. Additionally, abnormal labor patterns, such as prolonged or arrested labor, are linked to an increased risk, particularly when combined with other risk factors. The presence of multiple risk factors, such as macrosomia, operative delivery, and prolonged labor, further elevates the risk of shoulder dystocia.[8]

Overview of WHO Partograph

A partograph is a graphical record of the observations made during a woman's labor and a tool used for monitoring maternal and fetal well-being during the active phase of labor. The partograph serves as a decision-making aid when abnormalities are detected. When introduced into clinical practice along with a management protocol, labor outcomes are greatly improved. The partograph helps healthcare providers ensure that women are carefully monitored during labor, avoid unnecessary interventions, and promptly recognize and respond to complications The use of the partograph can reduce the number of prolonged labors (>18 hours) and assist in determining when to take appropriate actions, such as the need for labor augmentation with oxytocin injection, the rate of cesarean sections, and the incidence of infections.[9,10]

The typical labor process, involving two phases of cervical dilation (latent and active), was initially recorded on a graph in the 1950s. During the 1960s and 1970s, additional studies mapped out labor progression and established a scientific foundation for interventions aimed at preventing prolonged labor. These early labor charts laid the groundwork for the WHO's partograph model, which was adopted as an international standard in 1988 after the global Safe Motherhood Initiative was introduced. In 1990–1991, the WHO conducted a multicenter trial with over 35,000 women in Indonesia, Malaysia, and Thailand to assess the impact of the newly introduced partograph. The study revealed that incorporating the partograph into clinical practice, alongside a management protocol, significantly improved labor outcomes. It led to a reduction in the number of prolonged labors (lasting over 18 hours), decreased the need for labor augmentation with oxytocin, lowered cesarean section rates, and reduced the incidence of infections. Consequently, the WHO recommended the use of partographs to monitor all women in labor and identify abnormal progress and those who might require further interventions.[9,10]

A partograph is a printed graph that represents the stages of labor and includes an alert line and an action line. The alert line is drawn to indicate the beginning of the active phase, where the cervix dilates beyond 4 centimeters. During active labor, the healthcare provider regularly charts the descent and dilation of the cervix to monitor labor progress and determine when intervention might be necessary. Additionally, the provider records details about the mother and fetus, including fetal heart rate, the color of the amniotic fluid, the presence of molding, contraction patterns, and any medications administered. If the plot approaches the action line, it signals the need for interventions such as administering oxytocin, using a vacuum, or performing a cesarean section.[4,9,11]

Overview of the Friedman Curve

The Friedman curve is a tool used to monitor cervical dilation progress during the latent

phase of labor, relying on periodic physical examinations conducted after labor begins. This curve helps determine the onset of active labor and guides decisions on necessary interventions to improve outcomes for both the mother and the baby. The Friedman curve effectively tracks cervical dilation progress with a 72% accuracy rate during the latent phase, 79% during the acceleration phase, 78% during the maximum slope phase, and the highest sensitivity of 85% during the deceleration phase.[12]

The Friedman curve categorizes the active labor phase into three stages: the acceleration phase, the maximum slope phase, and the deceleration phase, assessing progress through vaginal examinations every two hours. Friedman identified two main issues during the active phase: protraction disorders and arrest of dilation. Protraction disorder is characterized by a slower-than-expected cervical dilation rate, with less than 1.2 cm/hour for nulliparous women and less than 1.5 cm/hour for multiparous women. Arrest of dilation is defined by the absence of cervical dilation within 2 hours or the absence of fetal descent within 1 hour.[1] For prolonged labor, recommended treatments include waiting, administering oxytocin for obstructed labor without cephalopelvic disproportion, and cesarean section for cases with cephalopelvic disproportion.[12]

Recently, the American College of Obstetricians and Gynecologists (ACOG) released new guidelines based on evidence from the Consortium of Safe Labor, which includes a revised curve. The new Friedman curve uses 3 to 6 cm dilation with 18 hours as the statistical limit, regardless of whether the woman is nulliparous or multiparous. It also states that protraction and arrest during the second stage could be identified if labor exceeds 3 hours without an epidural or 4 hours with an epidural in nulliparous women. For multiparous women, it could be diagnosed iflabor lasts more than 2 hours without an epidural or 3 hours with an epidural.[13]

WHO Partograph Vs Friedman

The comparison between the WHO Partograph and Friedman Curve in diagnosing labor dystocia is a crucial and relevant topic in efforts to improve the effectiveness of labor management. The WHO Partograph was developed as a clinical tool for monitoring the labor process to detect complications such as dystocia early. This partograph records clinical parameters such as cervical dilation, fetal head descent, and labor duration, which are then compared to established temporal standards to evaluate whether labor is progressing normally or deviating from the expected course.[11,14,15]

Conversely, the Friedman Curve is a graphical representation of cervical dilation over time, based on observations by Emanuel Friedman in the 1950s. This curve categorizes labor into two main phases, the latent and active phases, and provides temporal guidelines for expected cervical dilation during each phase. The Friedman Curve is often used as a standard in diagnosing dystocia, particularly when labor progresses more slowly than expected based on standardized time parameters. Although both tools are designed to identify dystocia and improve labor management, there are significant differences in their approaches, effectiveness, and clinical implications.[10,15,16]

From a clinical perspective, these tools differ significantly in terms of sensitivity and specificity. The WHO Partograph offers advantages in real-time monitoring, allowing for early detection of complications and quicker intervention responses. The success of the partograph in detecting dystocia heavily depends on the clinical skills and interpretation of the healthcare providers using it. Generally, the partograph contributes to reducing unnecessary interventions, such as cesarean sections, by enabling a more

holistic clinical assessment of maternal and fetal conditions before any intervention is performed.[9,10]

In contrast, the Friedman Curve provides a more specific temporal framework for measuring cervical dilation speed, with stricter time limits for diagnosing dystocia. This approach helps healthcare providers recognize labor delays that may indicate dystocia. However, the main limitation of the Friedman Curve is its lack of sensitivity to individual variations in the labor process, which can lead to overdiagnosis of dystocia and, consequently, unnecessary medical interventions. Studies have shown that strict adherence to the Friedman Curve may increase the rate of cesarean sections due to the tendency to view any deviation from the curve as an indication of dystocia requiring immediate intervention.[4,17]

Flexibility in clinical application is also crucial when comparing these two tools. The WHO Partograph is designed to be more adaptive, allowing adjustments based on individual patient conditions, such as maternal health status, gestational age, and obstetric history. This partograph also provides more structured intervention guidelines based on the monitoring charts, aiding healthcare providers in making more accurate decisions. In contrast, the Friedman Curve takes a more static approach, with little room for adjustments based on individual variations. While this design offers simplicity in application, its rigidity can lead to errors in diagnosis and inappropriate management.[4,11,13]

The impact of using these tools on labor-management relations is also noteworthy. Comprehensive use of the WHO Partograph can reduce unnecessary interventions and improve overall labor outcomes. This tool has proven effective in lowering cesarean section rates, which is one of the main challenges in modern labor management. By contrast, the rigid application of the Friedman Curve can increase the rate of interventions due to more restrictive interpretations of labor duration. Although this curve plays a role in identifying dystocia that requires intervention, its less flexible application can prompt medical actions that may not be essential.[10,11]

The implementation and education regarding the use of these tools also affect their effectiveness in clinical practice. The WHO Partograph has been widely adopted, especially in developing countries with limited resources, due to its simplicity and adaptability to various clinical situations. However, to ensure its effectiveness, proper training is required for healthcare providers to use the partograph correctly and consistently. Conversely, the Friedman Curve is more commonly used in developed countries, where a deep understanding of labor physiology and statistics is necessary for accurate application. Although the design of this curve is simple, misinterpretation can lead to inaccurate diagnosis and inappropriate management.[16]

Both tools, while beneficial, have limitations and have faced criticism from the medical community. The WHO Partograph is often criticized for challenges in consistent application, especially in high-workload environments with limited human resources. Additionally, the interpretation of the partograph can be highly subjective, depending on the experience and expertise of the healthcare provider. Meanwhile, the Friedman Curve, while offering a more quantitative approach, has also received criticism, particularly regarding its relevance to modern pregnant populations. Recent research suggests that today's labor processes may be more variable than depicted by this curve, meaning the standards set by the Friedman Curve may be too rigid and may not fully reflect the physiological variability that occurs.[17]

Overall, in the comparison between the WHO Partograph and the Friedman Curve, the WHO Partograph demonstrates

superiority in flexibility and sensitivity to individual variations in the labor process and in reducing unnecessary interventions. However, its success is highly dependent on adequate training and consistent use. In contrast, the Friedman Curve, while more specific and simpler in application, has limitations in flexibility and relevance to modern pregnant populations.

Conclusion

This study concludes that while both the WHO Partograph and the Friedman Curve are valuable tools for diagnosing and managing labor dystocia, the WHO Partograph offers greater flexibility and sensitivity to individual variations in labor. This adaptability enhances its effectiveness in reducing unnecessary medical interventions, such as cesarean sections, and in improving overall labor outcomes. In contrast, the Friedman Curve, though providing a more specific temporal framework, is less adaptable and may contribute to the overdiagnosis of dystocia, thereby increasing the rate of cesarean deliveries. The uccessful use of either tool depends significantly on adequate training and consistent application by healthcare providers. Consequently, the WHO Partograph is preferable in diverse clinical settings, especially in environments with limited resources. Meanwhile, the Friedman Curve may retain value in certain contexts but should be employed with caution.

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