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Relation Between Duration of Latent Phase of Labor and Neonatal Outcome

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Abstract: **Background:** The latent phase of labor, marked by initial cervical changes, varies in duration and remains controversial in its management. Differences exist between nulliparous and multiparous women, with varied definitions and diagnostic criteria complicating understanding and treatment. A prolonged latent phase in labor can impact neonatal outcomes through risks like fetal distress, meconium-stained amniotic fluid, and infections, necessitating varying degrees of medical intervention for the newborn's health.

Aim of the study: To determine the relation between duration of latent phase of labor and neonatal outcome.

Patients and methods: This case-control study, conducted at Al-Elwiya Maternity Teaching Hospital from 1st of January 2023 to 1st of November 2023, included two hundred women in the latent phase of labor (completed 36 weeks to 42 weeks gestation). Exclusions were active labor and contraindications to vaginal delivery. Comprehensive data on maternal, labor, and neonatal variables were collected.

Results: The study reported that a latent phase of labor lasting over 8 hours leads to higher cesarean sections rate, increased meconium-stained amniotic fluid, more pathological cardiotocography findings, and longer second stage of labor. Neonates born after such prolonged latent phases had lower Apgar scores at 1 and 5 minutes, indicating greater stress. These results highlight the significance of the latent phase duration in managing labor and predicting neonatal outcomes.

Conclusion: The study concludes that a prolonged latent phase of labor is associated with increased risks of cesarean delivery, neonatal stress, and other complications, emphasizing the need for possible labor management.

CHAPTER ONE

INTRODUCTION

1. INTRODUCTION

1.1 Background

The latent phase of labor frequently causes difficulties with recognition and definition, and its management remains controversial. Friedman, who defined the latent phase of labor, observed that the latent phases of nulliparas tended to be longer than multiparas[(1)]

1.2 Definition

The first stage of labor is broken down into the latent phase and the established phase. The latent phase of labor is the very beginning part of the first stage of labor. The latent phase begins with a long, firm cervix that is closed accompanied by irregular contractions and ends with a thin, paper like cervix that is soft and 4cm dilated accompanied by regular contractions. Established labor, begins with a cervix dilated 4cm accompanied by regular painful contractions and end when the cervix is 10 centimetres dilated[(1)] . The uterine contractions become progressively regular, polarized and coordinated, leading to the next active phase of labor. The latent phase of labor appears to be quite contentious among healthcare professionals worldwide in terms of definition, diagnosis and management. According to a number of sources, the duration of early labor ranges from 6–8 h up to 24–36 h[(2)]. Given its extremely variable duration, it is difficult to define a 'normal' or average range of time for this stage of labor. Contemporary studies of Zhang et al, suggest that the active phase of labor may not start until 5 cm dilation in multiparas and even later in nulliparous[(3)]. International guidelines recommend that the admission to hospital of women in early labor should be delayed by encouraging them to remain home until in active labor; if admitted, healthcare providers should not intervene to modify the length of labor while waiting for its spontaneous onset[(4)].

1.3 Definition of labor

Labor is a physiological process that signifies the end of pregnancy, characterized by progressive cervical dilation and effacement, driven by regular and coordinated uterine contractions, leading to the expulsion of the fetus and placenta from the uterus[(5)].

Diagnosis:

Diagnosis of labor involves a combination of clinical examination and assessment of symptoms:

1. **Clinical Examination:**

- **Cervical Assessment**: A vaginal examination to evaluate cervical dilation and effacement. Progressive changes in the cervix, particularly dilation beyond 3-4 cm, are indicative of active labor.
- **Palpation of Contractions**: Assessing the frequency, duration, and intensity of uterine contractions. In true labor, contractions tend to be regular, increasingly frequent, longer in duration, and more intense.
- **Membrane Status**: Checking for rupture of membranes can be part of the assessment, as this may precede or accompany labor[(6)].

2. **Symptom Assessment:**

- **Nature of Contractions**: True labor contractions are typically painful, start in the back and radiate to the abdomen, and become progressively stronger and closer together.
- **Other Signs**: such as a bloody show, which is a common precursor to labor.

Differentiation from False Labor:

- In false labor (Braxton Hicks contractions), contractions are irregular, often painless, and do not result in progressive cervical dilation or effacement. They may subside with activity changes or hydration[(7)].

1.4 Physiology of normal labor

The length of gestation in human beings is well defined. For 9 months the uterus remains largely quiescent, and the cervix acts as a sphincter keeping the fetus in utero until, at the onset of labor they undergo a marked role reversal and allow labor and delivery to occur. Towards the end of gestation there is a gradual down-regulation of the inhibitory systems keeping the uterus quiescent and the cervix closed, and an up-regulation of the procontractile influences. Eventually, as labor supervenes, the contractions gain in intensity and frequency. This uterine activity is accompanied

by cervical effacement and dilatation over several hours, ultimately allowing delivery of the fetus[8]. The mechanisms discussed below are summarized in Fig. 1.

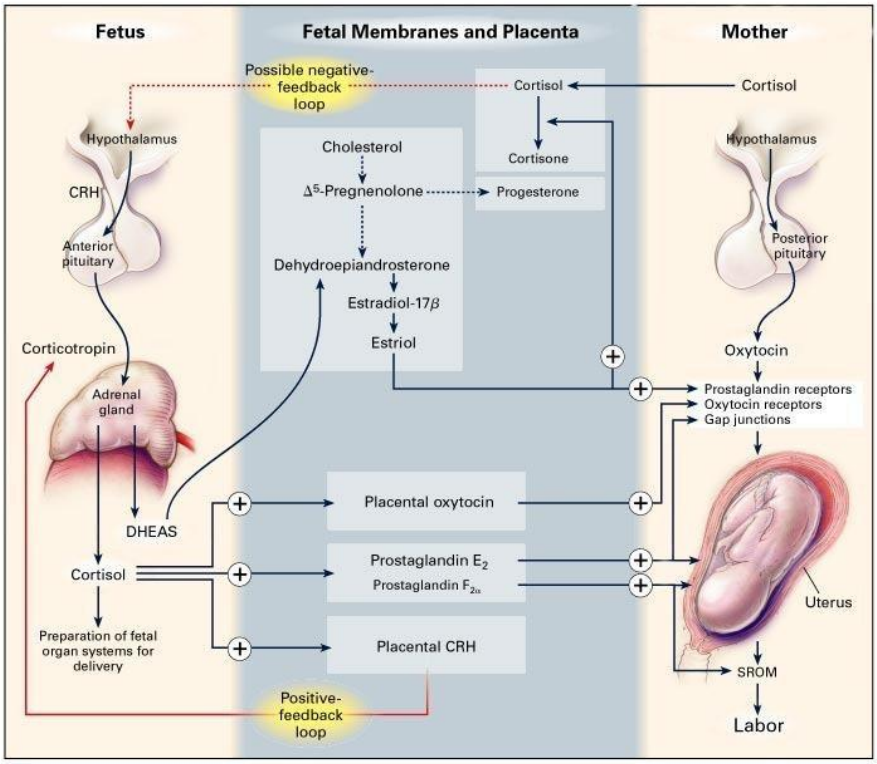

Figure 1-1 physiology of labor[8].

1.4.1 Myometrium

Myometrium is composed of smooth muscle cells, the myocytes. At a certain level of excitability of the myocytes, labor commences. Collagen and elastin surround the myocytes and are attached to them by dense bodies. These act as a support for the myocytes, allowing them to contract and shorten[9]. It is the formation of gap junctions between the myocytes that allows communication between the cells of the myometrium to produce the coordinated uterine activity typical of normal labor[10]. Areas of the myometrium near the cornua of the uterus act as a pacemaker region coordinating the contractions. Where normal muscle regains its length after a contraction, myometrium shortens each time it contracts, a process that aids effacement and dilatation of the cervix, delivery and involution[11].

1.4.2 Cervix

The former view that the cervix plays little role in pregnancy and labor other than remaining closed until dilating under the influence of uterine activity no longer holds true. The cervix undergoes many changes nearing the onset of labor. The cervix consists of muscle and fibroblasts, embedded in ground substance. The muscle content is not uniform throughout the cervix, with reduced amounts from the proximal to distal cervix. Fibroblasts produce collagen, elastin, proteoglycans and fibronectin[12]. Factors involved in the increased softening of the cervix as term approaches include a decrease in the amount of collagen and an increase in proteolytic enzyme activity leading to increased collagen turnover[1].

The cervix plays an active role in labor and the physical state of the cervix not only determines the rate of cervical change, but it also has an effect on tension in the uterine wall and intrauterine pressure[13].

Myometrium is under the influence of adrenergic, cholinergic and peptidergic innervation. The role of this input is currently uncertain. A sympathetic nerve supply to the uterus exists and both a- and b-receptors are present, the former are excitatory the latter inhibitory. There is also a

parasympathetic supply from the hypogastric plexus which supplies the cervix, and it is uncertain what role, if any, this plays in labor[14].

1.5 Stages of Normal labor

Labor, the process leading up to the delivery of a baby, is divided into three main stages, each characterized by specific events and physiological changes.

1. The First Stage of Labor: This is the longest stage and involves the onset and progression of cervical dilation and effacement (thinning). It's divided into two phases:

- The Latent Phase : This initial phase is marked by the beginning of contractions, which gradually become more regular and stronger. During this phase, the cervix begins to soften, thin, and dilate. For first-time mothers, this phase can last from several hours to days. Women may experience back pain, cramping, and a bloody show (vaginal discharge with blood) due to the rupture of small blood vessels in the cervix. Emotional support and comfort measures are essential during this phase.
- The Active Phase: Characterized by more intense and frequent contractions, the active phase sees rapid dilation of the cervix from about 4 to 10 centimeters. This is the phase where most women go to the hospital or birthing center. Pain management becomes a critical aspect, with options ranging from natural methods like breathing techniques and massage to medical interventions such as epidurals. Monitoring of the baby's heart rate is usually done to ensure their well-being[6].

2. The Second Stage of Labor: This stage begins when the cervix is fully dilated and ends with the birth of the baby. It's often referred to as the "pushing stage." Women are guided to push during contractions to help move the baby down the birth canal. The duration of this stage can vary, generally longer for first-time mothers. A healthcare provider will monitor the progress of the baby's descent and may use interventions like forceps or vacuum extraction if necessary. The position of the mother during this stage can vary, with options including lying back, squatting, or being on hands and knees, depending on comfort and the circumstances of the labor. The moment of birth is a culmination of this stage, as the baby emerges into the world[6].

3. The Third Stage of Labor: This final stage involves the delivery of the placenta and is the shortest stage. After the baby is born, contractions will continue but are usually less intense. These contractions help detach the placenta from the uterine wall. The mother may be asked to push gently to aid in the expulsion of the placenta. It's crucial to ensure that the entire placenta is delivered to prevent postpartum complications like hemorrhage or infection. This stage typically lasts from a few minutes to a half-hour. The healthcare provider will inspect the placenta to ensure it's intact and check the mother for any tears or lacerations that may need repair[6].

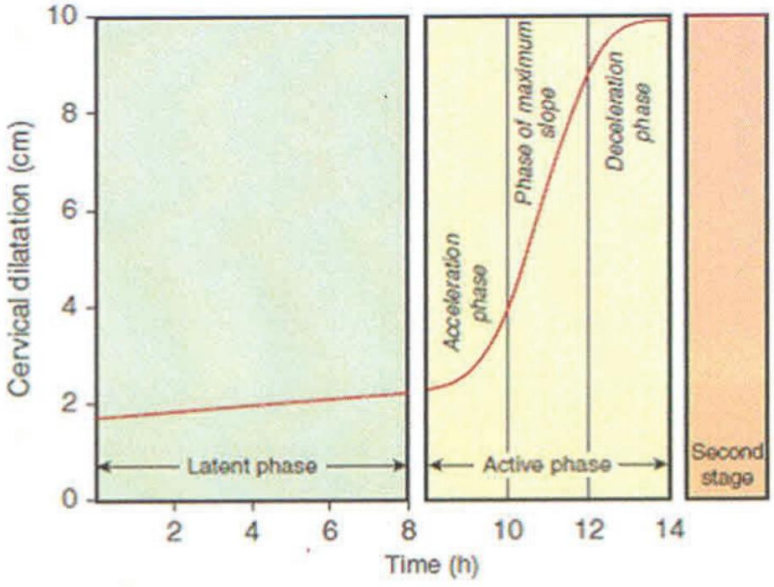

Figure 1-2: Friedman's Curve[15]

1.6 Prolonged latent phase of labor

Women are diagnosed with a protracted latent phase of labor between 5% and 6.5% of the time [16].

The majority of clinicians are still using Friedman's original criteria from 50 years ago because there are no contemporary diagnostic standards for protracted latent period. More than 20 hours of latent phase in nulliparous women and more than 14 hours in multiparas was defined by Friedman[1]. Without respect to artificial time restrictions, intervention is necessary when there is a maternal or fetal indication for accelerating the birth, when outpatient care options have failed, or at the woman's request. The mother's physical and emotional state (her level of weariness, her ability to cope, her support system, and her cervical status) informs the decision to stimulate uterine contractions or rest, respectively.

1.6.1 Diagnosis of latent phase

Previously Diagnosed Latent phase, like its terminology, has been the center of various debates. For those who don't get into the concept of latent phase labor, the first stage of labor is always considered to begin with the active phase because all changes prior to the active phase are simply prelabor alterations with no clinical relevance. At term, contractions linked with a cervical dilatation of less than 3cm are considered to be part of the latent phase of labor, as defined by Friedman, whereas contractions associated with a dilation of 3cm to 10cm are considered to be part of the active phase of labor[1] . The World Health Organization (WHO) adopted the idea and released a Partograph for monitoring early labor. There is no mention of cervical effacement, and the requirement of a 3cm dilation for active phase diagnosis applies to both first-time mothers and those who have already given birth. Full cervical effacement is more typical in primigravida before dilatation begins, whereas in multipara both occur simultaneously[17]. This means that even though they may have reached 3 cm in circumference, primigravida and multipara who have not yet reached the necessary effacement are not technically in active phase. Others have argued that a cervical dilation of 3 cm is not yet reliable enough for a diagnosis of active phase in both primigravida and multipara and have instead advocated for a more advanced cervical dilatation of at least 5 cm, defining latent phase as a cervical dilatation of 4 cms or less. Others have recommended varying parameters for primigravida and multipara, with active phase in the primigravida defined as full 100 percent effacement and at the same time 3cm dilation, and latent phase in the multipara defined as 50 percent effacement and 4cm dilatation or less[18] . Later ideas necessitated thinking about cervix effacement in addition to cervical dilation. This is because some first-time mothers may reach 3 cm of cervical os dilatation without reaching full effacement, while some experienced mothers may reach 4 cm of dilatation without reaching full effacement. In order to avoid misdiagnosing latent for active phase labor, it is crucial to use reliable and objective measures for determining cervical dilation and cervix effacement during labor. When a woman is in active phase labor, a normal cervical dilatation rate of 1cm per hour is predicted as part of the plan for care; nevertheless, this assumption will be incorrect if active phase labor has not been accurately diagnosed. However, not everyone agrees with the World Health Organization's (WHO) 1988 diagnosis of latent phase because it does not account for cervical effacement and dilatation.

Existing prognosis In 2000, the World Health Organization proposed a new concept for the diagnosis of latent phase labor: active phase labor was defined as a cervical dilation of 4cm in all women at term with progressive contractions at least once every 10 minutes. By deciding that all pregnant women should aim for a cervical os dilatation of 4cm, the issue of effacement becomes moot for both primigravida and multipara[19]. This means that in current clinical practice, latent phase labor is defined as progressive contractions at term with cervical os dilatation of 3cm or less. This is currently the gold standard for making a diagnosis in both the latent and active stages.

1.6.2 Classification of latent phase: past and present

1.6.2.1 Friedman's concept and the controversies

According to Friedman's research, the latent phase occurs early in the initial stage of labor and precedes the active phase, which typically lasts for 20 hours in primigravida and 14 hours in

multipara. Friedman's classification of the latent phase relied on the results of therapeutic intervention under deep sedation, as described below[20].

Those women who, after being sedated, enter into an active phase of labor within 20 hours for primigravida and 14 hours for multipara, with the start of labor timed by the women's recollection of when contractions became uncomfortable.

The five percent of cases that did not enter active phase within 20 hours (for primigravida) or 14 hours (for multipara) were classified as having a prolonged latent phase[20]

False labor is the term used to characterize the 10% of primigravida and multipara instances in which the contractions entirely stopped after the sedative was administered[21].

Some workers disagree with Friedman's classification, particularly of the prolonged latent phase, claiming that it is unreliable because it relies on the women's memories of when they first felt the pain of contractions and when labor actually began. Friedman found that the incidence of the prolonged latent phase was the same across all parities, at around 3%-4%, and never higher than 5%[22].

Partogram

The active phase of labor, which begins when the cervix is about 4 cm dilated and continues until full dilation is achieved, is the primary focus of the partogram. Variations of the partogram have been created to incorporate the recording of the latent phase of labor, however, because it is important to monitor the complete labor process. Here are examples of two popular kinds of latent-phase partograms[23]:

First, there is the modified Friedman's Partogram, which is based on the original Friedman's Partogram but expands beyond its primary focus on the active period of labor. The new version includes the latent phase, so doctors can track labor's development from the first signs of regular contractions. It has spaces for tracking uterine contractions and the fetal heart rate, as well as cervical dilation, effacement, and presenting part station over time. This sort of partogram depicts the full labor process graphically, including the latent phase[24].

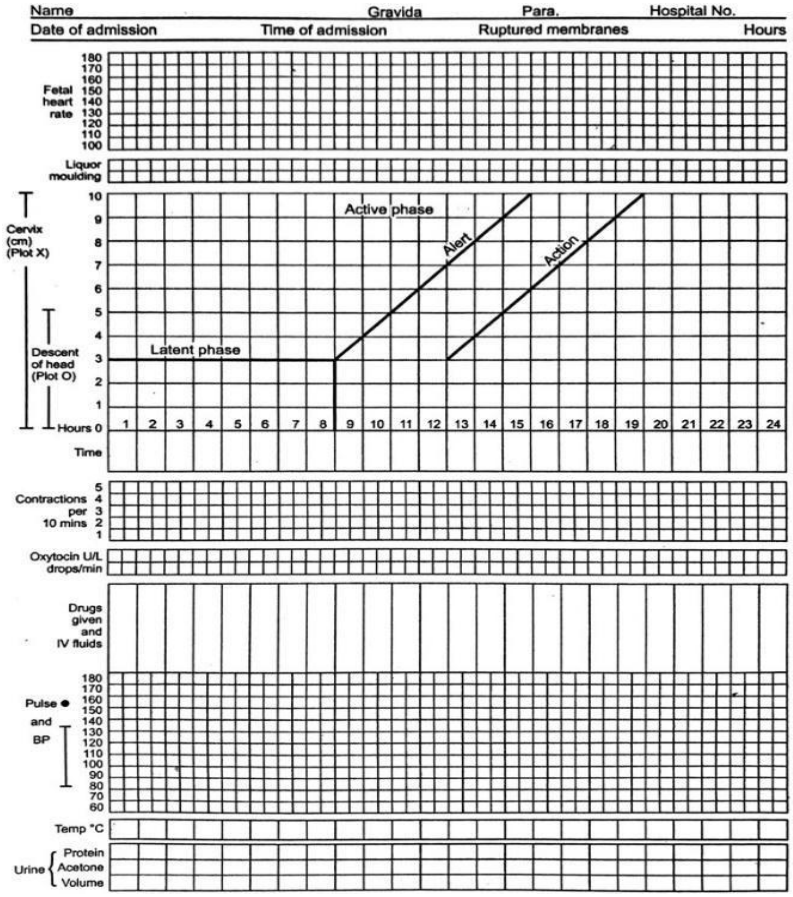

Figure 1-3 modified Friedman's Partogram[25]

Second, the WHO Partogram, also known as the Modified WHO Partogram, is a standardized partogram created by the World Health Organization (WHO). Many hospitals and clinics all throughout the world utilize this partogram regularly. The WHO Partogram covers the entire labor process, from the first signs of contractions until delivery. It includes monitoring the fetal heart rate, cervix dilation, and uterine contractions. Alert lines, which indicate certain parameters for cervical dilatation and descent of the presenting part, are also incorporated into the partogram. Changes from these thresholds can indicate problems and help direct fixes[19].

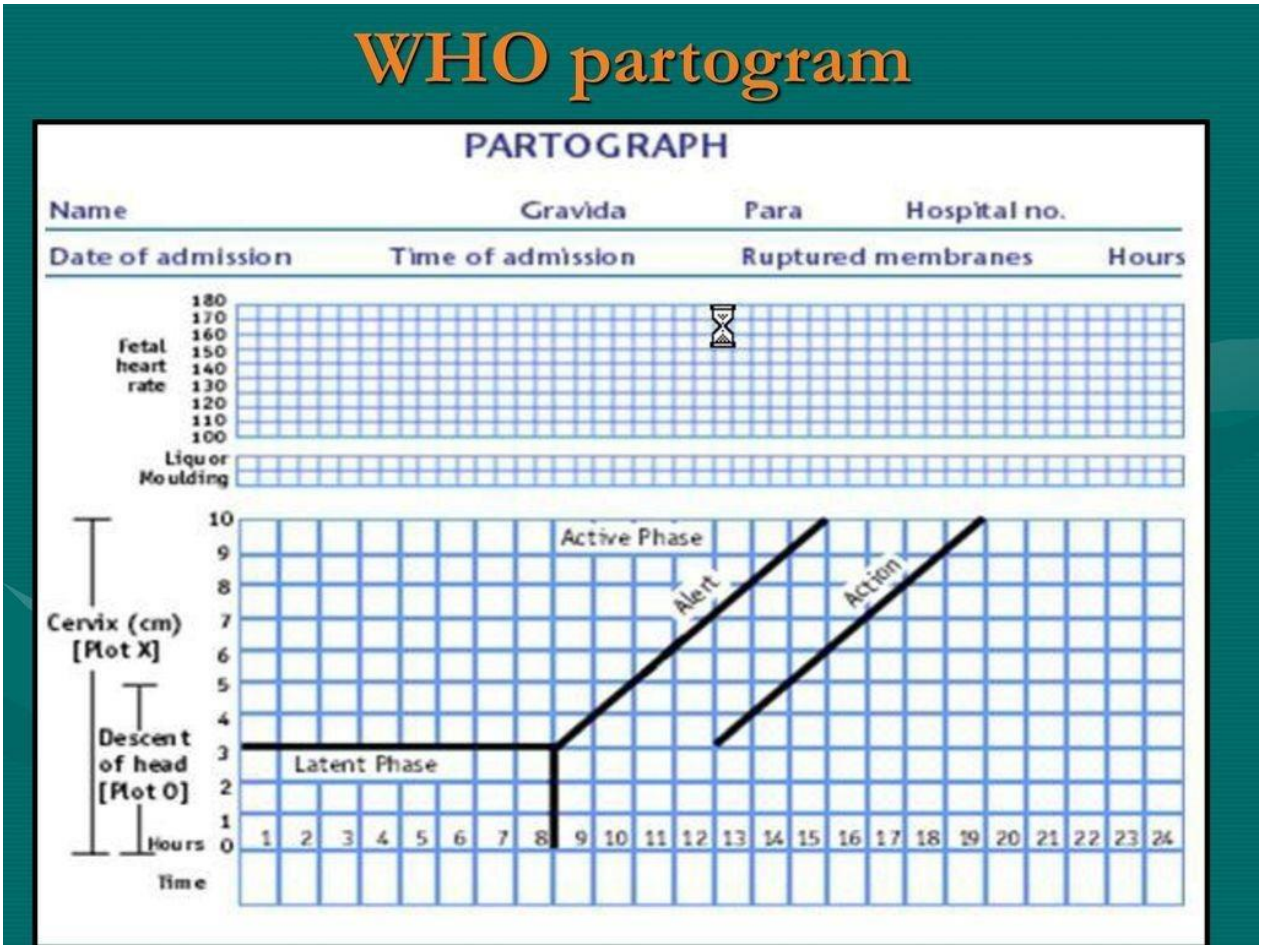

Figure 1-4: WHO partogram[26]

Both of these types of partograms provide a visual representation of the labor progress, including the latent phase. They allow healthcare providers to identify deviations from the normal labor pattern, assess the well-being of the mother and the baby, and make informed decisions regarding the management of labor. By monitoring the latent phase, healthcare providers can identify potential issues early and provide appropriate support, interventions, or further evaluations as needed. It's worth noting that specific variations of partograms may exist depending on the healthcare facility or region. The purpose of any partogram that includes the latent phase is to provide a standardized framework for monitoring labor, promoting safe and effective care for both the mother and the baby throughout the entire labor process[27].

1.6.2.2 WHO classification and controversies

WHO classification in 1988 presented as follows:

i. Normal latent phase is a duration of 8hours in all parities in which active phase occurred

ii. Prolonged latent phase is a duration of over 8hours in all parities in which active phase has not occurred

iii. False labor are the cases who after 8hours of latent phase had no contractions following sedation in all parities but still active phase features has not occurred. This means that false labor by this

classification is a differential diagnosis of prolonged latent phase because in both situations active phase has not occurred after 8 hours, but in prolonged latent phase there are still contractions while in false labor there are no contractions[28].

This WHO classification has several controversial areas. Firstly, prolonged latent phase is when active phase has not occurred after 8 hours as the lower limit but the maximum duration of prolonged latent phase was not defined and this is important for cases that may still remain in latent phase for longer periods like 24hours or beyond. Secondly, the absence of contractions after 8 hours of latent phase does not appear a dependable enough differential, between prolonged latent phase and false labor because of the very common clinical observation that often some cases who turn out to establish active phase within 8hours do have weak and infrequent contractions at the time of admission whereas some women with strong and frequent contractions at the time of admission fail to establish in active phase within 8 hours. This may suggest that consideration of false labor as a differential diagnosis of prolonged latent phase labor based on the presence or absence of contractions following sedation after 8 hours in those not transformed yet into active phase, is rather simplistic[29]. Hence some workers have suggested a classification in which prolonged latent phase is a situation in which latent phase features persist after 8hours in spite of sedation but up to a maximum duration of 24hours irrespective of whether or not there are contractions. False labor is the state when the latent phase feature is persisting after 24hours irrespective of the contraction status . Thus by this classification, latent phase is a continuum classified as normal latent phase when duration is within 8 hours but prolonged latent phase when duration is over 8 hours but within 24 hours and false labor when the latent phase features are persisting beyond 24 hours without transformation into active phase[29].

1.7 Duration of latent phase of labor

Normal versus prolonged — No uniformly accepted contemporary criteria exist for the normal duration of the latent phase. As discussed above, the times for the onset of the latent phase and the transition from the latent phase to the active phase cannot be determined precisely and are subjective, so determining the duration of a normal latent phase is problematic.

Latent phase can be considered prolonged when the duration exceeds the 95th percentile.

- Friedman/1950s data – Friedman considered the latent phase prolonged in parturient who had not entered the active phase by the 95th percentile for duration of the latent phase in pregnant people in spontaneous labor. In nulliparas, this was 20 hours and in multiparas, 14 hours. Friedman defined the beginning of the latent phase as the time when the patient felt significant, regular uterine contractions and a clinician noted slow cervical dilation; the end of the latent phase (i.e., the beginning of the active phase) was the time of the upswing in the cervical dilation over time curve[30].
- Contemporary data – Contemporary data at 2010 show that many pregnant people with latent phases longer than the upper limit of normal historically described by Friedman go on to have a normal active phase and vaginal birth, which suggests that Friedman's definition is too narrow [31]. A contemporary prospective study at 2019 including nearly 1300 healthy, predominately White participants noted that the latent phase was 10 hours longer than Friedman described[32]. In this study, the 95th percentile in nulliparas was 30 hours (median 9 hours) and in multiparas, 24.5 hours (median 6.8 hours). The beginning of the latent phase was measured from the patient's first recognition of symptoms and the end was clinician assessment that the patient had entered the active phase on the basis of symptoms and cervical dilation.

Although active phase and second-stage arrest are clinical entities, latent phase arrest is not, given the slowness of the latent phase[32].

1.8 Causes of Prolonged latent phase

Although the exact cause of a long latent period has yet to be identified, we think that it may be due to insufficient or disordered myometrial contractility or a genetic or acquired obstacle to normal

cervical and uterine remodeling. This malfunction may also increase the risk of having false labor. Several clinical characteristics have been linked to a longer latent period (Table), including maternal obesity, which is also related with problems in the active phase. When labor first begins, the latent period typically lasts longer if the cervix is not fully developed. In a recent study researchers found that chorioamnionitis and fetal malposition were common among women who had experienced a long latent phase. These correlations have never had their causes explained. Chorioamnionitis' effects are likely due to the fact that an infection in the uterus slows down labor[33].

Table 1-1: Prolonged latent phase association.

Deficient prelabor cervical remodeling
Excessive sedation, analgesia, or anesthesia
Maternal obesity
Malposition
Chorioamnionitis
Post term labor

1.9 Management

Prolonged latent phase management is contentious. Some experts say that oxytocin is the best way to deal with a protracted latent period because it indicates an underlying labor irregularity, while others advocate for a more conservative strategy such as therapeutic rest. Despite the lack of evidence from randomized controlled studies to support their usage, many doctors continue to employ these two therapeutic strategies that were first proposed by Friedman. Neither treatment has been conclusively demonstrated to be more effective than the other, therefore either can be used as long as the woman is informed of the potential consequences[22].

Therapeutic rest has the risk of extending dysfunctional labor; oxytocin carries the danger of inadvertently inducing labor if the woman is already in prelabor and is linked to an increased likelihood of cesarean delivery. Excessive use of narcotics, analgesics, or sedatives, or an unfavorable cervix, might all lengthen the latent phase.

Half of the women who entered the latent phase with an unfavorable cervix, as documented by Friedman, experienced a more extended latent phase.

There is some debate regarding whether or not epidural analgesia is effective during the latent phase. Epidurals lengthen the first stage of labor slightly but not dramatically[16].

Initiation of oxytocin occurs after epidural analgesia significantly more often than after parenteral opioid analgesia, suggesting that epidural analgesia may influence the dynamics of the initial stage of labor.

1.9.1 Outpatient medications for therapeutic rest

Therapeutic rest involves administration of medication to relieve discomfort and allow for progression of labor while the woman rests or sleeps but their effectiveness has never been studied. The medication is taken once and is not combined with other drugs. If the woman returns with contractions and remains exhausted, other treatment options should be considered[16]. Although barbiturates such as pentobarbital 100 mg and secobarbital 100 mg were once popular, they are currently contraindicated because of their anti analgesic effects in the mother and prolonged depressant effects in the neonate. They freely cross the placenta, and because the half-life of barbiturates is quite long, the newborn’s attention span may be depressed for upward of 4 days. They have no known antagonist[34].

1.9.2 In-patient management of prolonged latent phase therapeutic rest with morphine

Therapeutic rest in a hospital setting was Friedman's first choice and strongest recommendation for patients in a lengthy latent phase. Subcutaneously or intramuscularly, a single dose of morphine

sulfate 15 mg is administered (20 mg for a large woman). If the woman's contractions have stopped or her breathing has slowed down after 20 minutes, she will not receive any further treatment. If the contractions persist and the cervical dilatation has not changed, a further 10 mg of morphine sulfate may be administered. Analgesia from injectable morphine often kicks in within 10 to 20 minutes and lasts for 2.5 to 4 hours. In contrast, the effects of an intravenous injection typically become noticeable within 3–5 minutes and continue for 1.5–2 hours[35].

Respiratory depression, sedation, euphoria, dizziness, nausea, vomiting, urine retention, and reduced gastrointestinal motility and gastric emptying are all potential adverse effects of opioids in pregnant women[36].

Morphine's rapid placental transfer and long half-life make it a serious threat to the neonate's respiratory system. Possible neurobehavioral effects last for at least 2–4 days after exposure. It is not yet known what role these neurobehavioral alterations play.

It is not appropriate to utilize morphine in the outpatient setting due to the hazards it poses to both the mother and the newborn. Opioid painkilling effectiveness is under closer investigation than ever before. Recent research has shown that while morphine and meperidine may induce deep sleep for the laboring woman, they do little to nothing to alleviate her discomfort. On a scale from 0 to 10, Soontrapa reported a decrease in pain from 7.5 to 5.4 after taking meperidine. However, this reduction may serve as an effective analgesic for a woman in prelabor or the latent phase of labor, even though it did not give clinically relevant pain alleviation for active labor[37]. The fatigued woman may find relief from the sedative effects of morphine. It is crucial to check the progress of labor before administering morphine so that the drug is not given during the vigorous period of labor, which might cause respiratory depression in the newborn[38]. Morphine is safe and effective when used properly. No research has been conducted on the effectiveness of other systemic opioids for the treatment of a prolonged latent phase. When administering parenteral opioids, some doctors choose to mix them with promethazine to lessen the nausea and vomiting that can occur. It is unknown whether or whether promethazine has any analgesic effects. One study discovered that while giving pregnant women a combination of promethazine and pethidine (Demerol) helped alleviate their morning sickness, it also caused them to feel extremely sleepy and lethargic. The anti-nausea and vomiting effects of pethidine were found to be enhanced by metoclopramide .There was no evaluation of neonatal outcomes. While Friedman agreed that therapeutic rest and oxytocin both have their benefits, he favored sedation since it allowed the woman to relax before active labor began and helped rule out the 10% of women who were in prelabor, preventing unnecessary inductions. Possible results of therapeutic rest and maternal and fetal adverse effects of morphine administration should be discussed before to initiating any treatment plan[39].

1.9.3 Boosting Oxytocin

The unfavorable maternal and fetal side effects and inferior analgesia associated with morphine; the increased availability and superior analgesia of epidurals, have all contributed to oxytocin becoming the treatment of choice for prolonged latent phase of labor over the past 15 years. However, studies on typical procedures in the USA are sparse. When therapeutic rest has failed, the woman is 41 weeks pregnant, or she is 39 weeks pregnant or older, oxytocin is often used as an alternative to expectant management[22].

1.9.4 Amniotomy

The decision to perform an amniotomy during the first stages of labor is controversial. Amniotomy has been shown to lower the need for oxytocin augmentation and shorten the duration of labor by an average of 60 to 120 minutes, according to a Cochrane review. However, the rising rate at which cesarean sections are being performed due to fetal heart rate anomalies shows that these surgeries should be reserved for women whose labor is progressing abnormally[40].

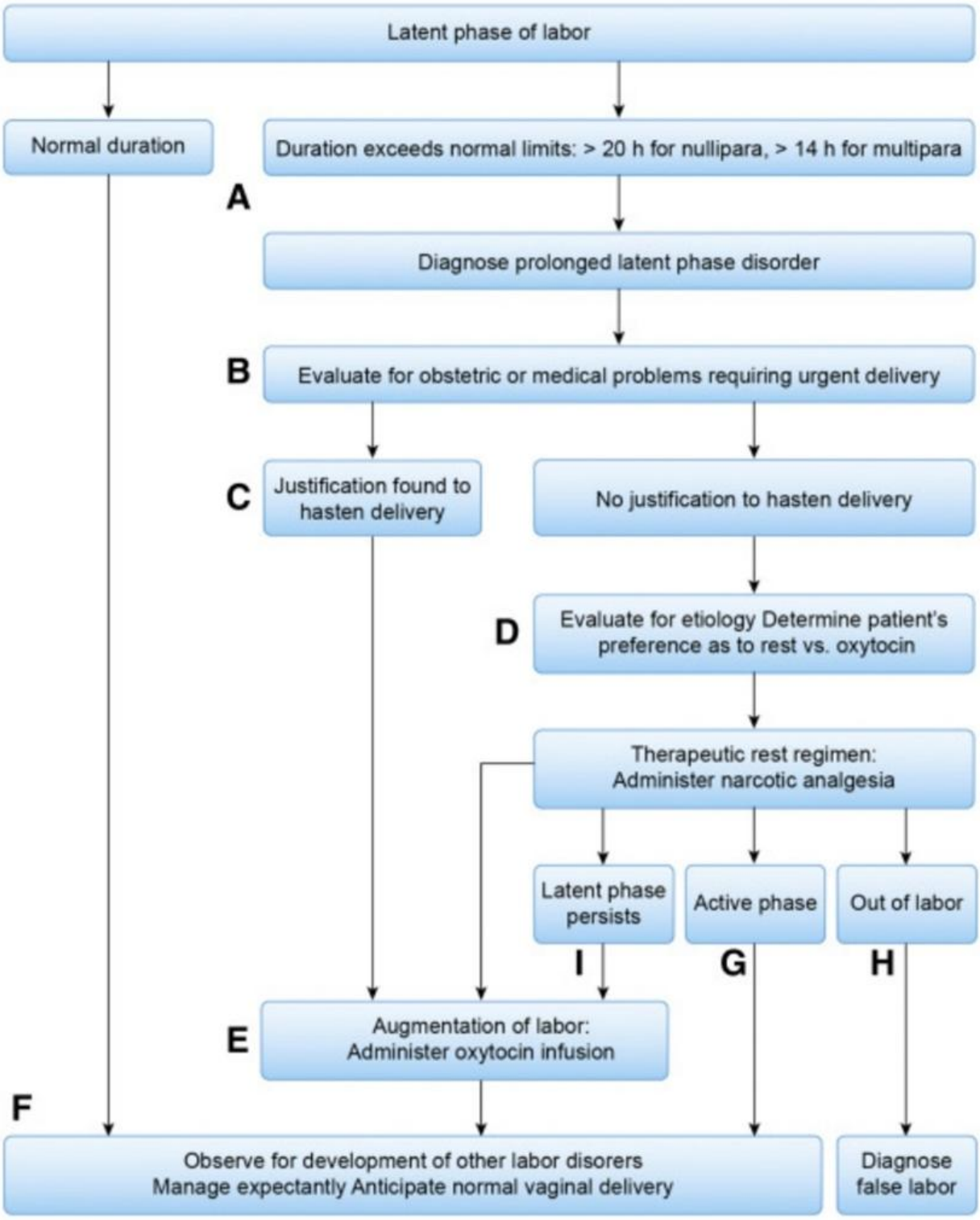

Figure 1-5: Management of prolonged latent phase of labor[1]

1.10 Outcome of prolonged latent phase of labor

1.10.1 Maternal

The maternal outcome of a prolonged latent phase of labor refers to the health and well-being of the mother when she experiences an extended period of labor before active labor begins. The impact of a prolonged latent phase on maternal outcome can vary and may include the following considerations:

1. Maternal Exhaustion: Prolonged labor can lead to increased physical and emotional exhaustion for the mother. The extended duration of contractions and the associated discomfort can be

draining, both physically and mentally. Fatigue and exhaustion can affect the mother's ability to cope with labor and may necessitate additional support or interventions[41].

2. Emotional Stress and Anxiety: The prolonged latent phase can be emotionally challenging for the mother, leading to increased stress and anxiety. Uncertainty about labor progress and concerns about the well-being of the baby can contribute to heightened emotional distress. Adequate emotional support from healthcare providers, partners, or birth companions is crucial in helping mothers navigate this phase[42].

3. Increased Risk of Intervention: Prolonged latent phase may increase the likelihood of medical interventions. If the labor progress is insufficient, healthcare providers may consider interventions such as augmentation of labor (using medications to strengthen contractions), rupture of membranes, or in some cases, a cesarean section. These interventions aim to ensure the safe delivery of the baby but may have implications for the mother, such as a higher risk of infection or the need for postpartum recovery[42].

4. Risk of Infection: Prolonged rupture of membranes (when the amniotic sac has broken) increases the risk of infection for the mother. When the protective barrier of the amniotic sac is compromised for an extended period, bacteria can enter the uterus and potentially lead to infections like chorioamnionitis. Prompt medical attention and appropriate management can help mitigate this risk[43].

5. Maternal Coping and Support: The prolonged latent phase may test a mother's coping abilities and require additional support. Continuous support from healthcare providers, birth companions, or doulas can help alleviate anxiety and provide comfort measures during this extended period of labor[43].

It's important to note that the maternal outcomes of a prolonged latent phase can vary widely, depending on various factors, including the specific circumstances of each case, the mother's overall health, and the quality of care provided. Healthcare providers closely monitor the progress of labor and the well-being of the mother to identify any potential issues and provide appropriate support and interventions when needed. Ultimately, the aim is to ensure the well-being and safety of both the mother and the baby during labor and delivery. Regular communication, informed decision-making, and individualized care are essential in managing the challenges associated with a prolonged latent phase and promoting a positive maternal outcome[44].

1.10.2 Neonatal

When a laboring mother goes through a longer period before active labor begins, the health and wellbeing of the newborn infant is referred to as the neonatal result of a prolonged latent phase.

Several variables affect how a longer latent phase affects a baby's chances of survival. Several important factors include:

First, fetal distress can occur if labor lasts too long and maternal stress levels rise. When the baby's oxygen supply drops too low or there are other problems during delivery, this is called fetal distress. Fetal heart rate monitoring allows medical staff to detect any abnormalities and respond quickly to ensure the wellbeing of the unborn child[41].

Second: Amniotic fluid tinged with meconium: If labor drags on for too long, the baby may pass meconium (the infant's first stool) in the womb. Fetal discomfort, as indicated by meconium-stained amniotic fluid, may necessitate increased postpartum care to prevent meconium aspiration syndrome[45].

The third risk is an infection, which can affect both the mother and the child if the labor process takes too long. A higher risk of infection in the infant is associated with a protracted membrane rupture (after the amniotic sac has ruptured). This threat can be lessened by prompt medical treatment and proper therapies such the use of antibiotics[45].

In circumstances of a lengthy latent phase, newborn outcomes can vary greatly. Babies can be born healthy and without complications despite extended labor in rare cases. In other situations, though, the baby's health and safety may demand more extensive medical intervention[44].

1.11 Aim of Study

To determine the relation between duration of latent phase of labor and neonatal outcome.

CHAPTER TWO

PATIENTS & METHODS

2. PATIENTS AND METHODS

2.1 Study Design, Setting and Data Collection Time

This is a case-control study conducted at the Department of Obstetrics and Gynecology at Al-Elwiya Maternity Teaching Hospital during a period extended from 1st of January 2023 to 1st of November 2023.

2.2 Study patients and sample size

The study included two hundred women who presented to inpatient clinic at Al-Elwiya Maternity Teaching Hospital.

2.3 Inclusion criteria

- Pregnant women presented at latent phase of labor from (36-42) weeks of gestation.

2.4 Exclusion criteria

- In the active phase of labor.
- Patients with contraindication to vaginal delivery.
- Women not in labor.
- Refusal to participate.
- Women with medical disease (e.g. diabetes, hypertension, preeclampsia, etc.)

2.5 Ethical considerations and official approvals

Verbal permission was obtained from each participants prior to collecting data, and information was anonymous. Names were removed and replaced by identification codes. All information kept confidential in a password secured laptop and data used exclusively for the research purposes.

Administrative approvals were granted from the following

1. The Council of Iraqi Board of Medical Specialization.
2. Approval and agreement of the Department of Obstetrics and Gynecology at Al-Elwiya Maternity Teaching Hospital.

2.6 Data collection:

With the aim of capturing a wide range of maternal, labor, and neonatal characteristics, a thorough questionnaire that served as the main tool for data collection in our study were used.

The cases were received at the obstetric clinic; cases who had uterine contractions were admitted to the ward where they were given painkillers, and if the contractions were abolished then discharged from the ward. Otherwise monitoring through examination and CTG monitoring started until they reached 4 cm cervical dilatation then transferred to the delivery room.

2.6.1 Maternal Data:

The questionnaire had sections for the mother's age, and BMI as well as for her parity (the number of children she has had) and gestational age (GA) at the time of childbirth. Additionally,

information on the mother's past health and obstetric history, including any problems with pregnancy or delivery, was gathered.

2.6.2 Physical Examination:

After being admitted, a comprehensive physical examination was conducted, and the results were documented. This comprised measurements of overall health as well as a pelvic examination and a targeted obstetric assessment.

Diagnosis of latent phase of labor done by full history and examination.

2.6.3 Labor Data:

Information on labor was carefully gathered. The length of both the latent period and the active phase of labor was noted, as well as the fetal heart rate at admission. It was recorded how many contractions occurred every 10 minutes. We use WHO partogram.

It was noted whether the amniotic fluid (liquor) was clear, meconium-stained, or bloody during labor. The results of the cardiotocography (CTG) were classified as normal, suspect, or abnormal.

It was possible to determine whether the patient had any medical attention during labor by looking up data on medical interventions. The occurrence of any problems during labor were also noted.

2.6.4 Neonatal and Delivery Data:

The time of delivery and other delivery-related information were logged. Neonatal outcomes were noted, including appearance, pulse, grimace, activity, and respiration (APGAR) ratings at one and five minutes after birth, the newborn's weight at delivery, and any neonatal complications (such as respiratory distress, admission and stay in neonatal intensive care unit (NICU) and the need for resuscitation of oxygen therapy).

2.6.5 Maternal Complication Data:

Any maternal problems following birth were reported in form of postpartum hemorrhage, admission to ICU, requirement of blood transfusion, and prolonged hospital stay in addition to the mode of delivery.

This broad data gathering technique allows for a thorough investigation of the potential implications on the association between the latent phase of labor and newborn outcomes, taking into account both historical and physical examination data.

2.7 Statistical analysis

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 26. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test (two tailed) was used. P value < 0.05 considered statistically significant.

CHAPTER THREE

RESULTS

3. RESULTS

The distribution of the study based on the duration of the latent phase of labor is illustrated in Figure 3-1. The cohort was categorized into two distinct groups: those who experienced a latent phase of labor lasting longer than 8 hours, and those with a latent phase of labor lasting 8 hours or less. Of the 200 participants analyzed, a majority of 68% (136 individuals) had a latent phase of labor that was more than 8 hours in duration, suggesting a predominance of this duration range within the population studied. Conversely, a smaller yet significant proportion of 32% (64 individuals) experienced a latent phase equal or less than 8 hours. This bifurcation is critical to the ensuing analysis of neonatal outcomes in relation to the length of the latent labor phase.

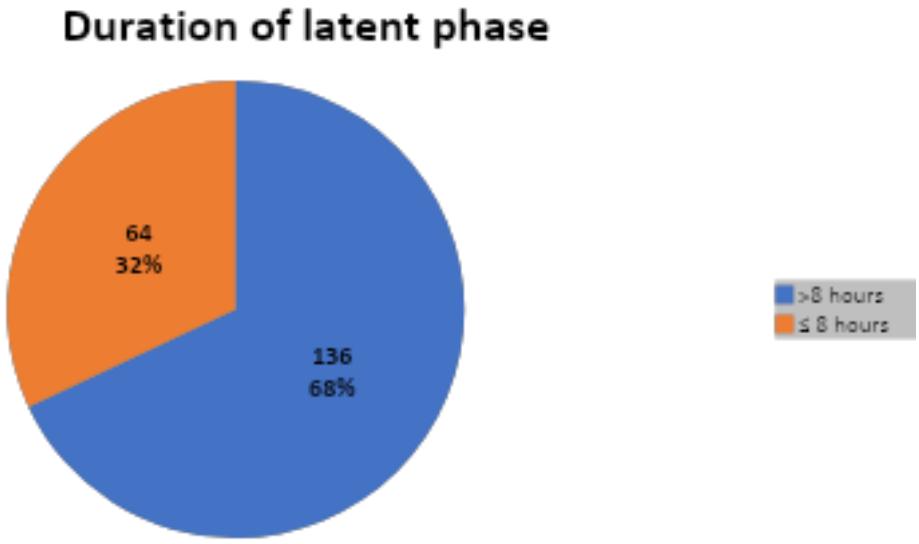

Figure 3-1: Distribution of cases according to the duration of latent phase of labor.

Table 3-1 presents a comparative analysis of maternal characteristics stratified by the duration of labor. The variables assessed were maternal age, Body Mass Index (BMI), and gestational age at the time of delivery. For those with a labor duration of 8 hours or less, the mean maternal age was 27.23 years with a standard deviation (SD) of 6.27, while the mean BMI was 28.32 kg/m^2 with an SD of 4.25 kg/m^2. The mean gestational age for this group was 39.13 weeks, with an SD of 1.41. In contrast, for those whose labor duration exceeded 8 hours, the mean maternal age was slightly lower at 25.91 years (SD = 6.94), and the mean BMI was comparable at 28.23 (SD = 4.59). Notably, the mean gestational age for this group was 39.59 weeks, showing a slight increase with an SD of 1.52.

Statistical analysis of these parameters revealed that there were no significant differences in maternal age (P = 0.197) or BMI (P = 0.884) between the two groups. However, the difference in gestational age was statistically significant (P = 0.042), indicating that a longer duration of labor was associated with a slightly higher gestational age at delivery. This finding could suggest potential implications for the timing of labor onset and warrants further investigation into its impact on neonatal outcomes.

Table 3-1: distribution of maternal age, BMI, and gestational age according to duration of labor.

Variables	**≤ 8 hours**	**> 8 hours**	**P value**
	Mean ±SD	**Mean ±SD**	
Maternal age	27.23 ±6.27	25.91 ±6.94	0.197
BMI	28.32 ±4.25	28.23 ±4.59	0.884
Gestational age	39.13 ±1.41	39.59 ±1.52	**0.042**

Figure 3-2 delineates the duration of the latent phase of labor stratified by parity. The mean duration for primiparous women—those experiencing their first childbirth—was recorded at 14 hours with a standard deviation (SD) of 6.11 hours. Conversely, multiparous women, who have previously given birth, exhibited a mean latent phase duration of 9.29 hours with an SD of 2.94 hours.

A statistical analysis reveals a significant difference in the duration of the latent phase between primiparous and multiparous women, with a P value of 0.001. This substantial disparity underscores the potential influence of prior childbirth experiences on the duration of the latent phase. The shorter latent phase in multiparous women may indicate a more efficient labor progression, possibly due to physiological changes from previous deliveries.

The marked variation in the latent phase duration between these two groups highlights the need for nuanced clinical approaches when managing labor and underscores the relevance of parity in labor progression and potentially, neonatal outcomes.

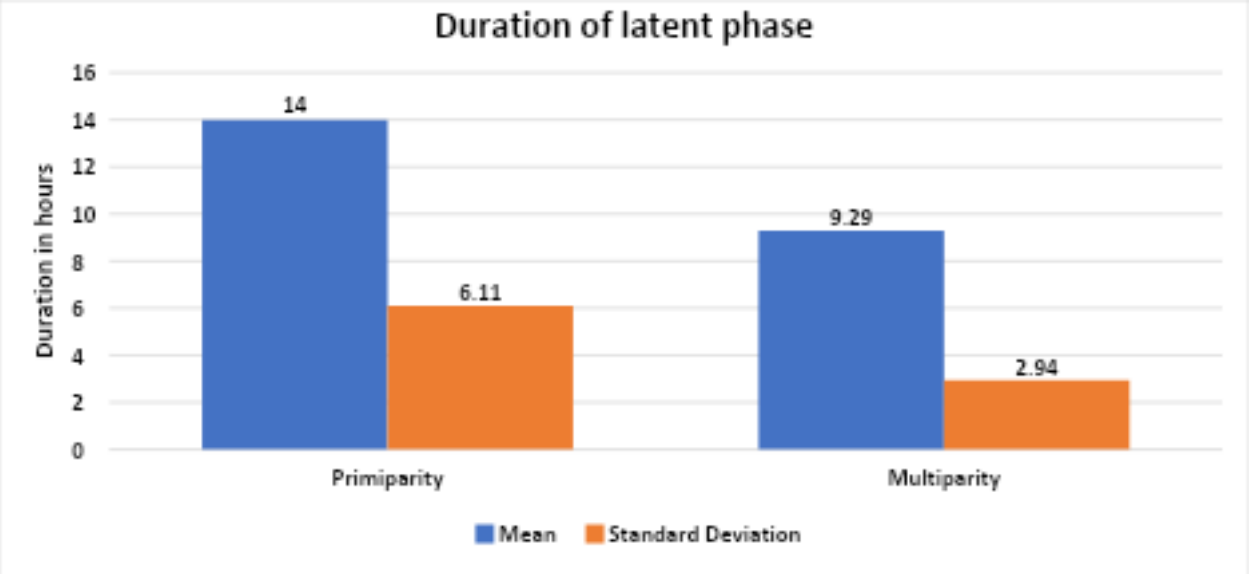

Figure 3-2: Distribution of duration of latent phase according to parity.

Figure 3-3 compares the duration of the latent phase of labor between primiparous and multiparous women. In the primiparous group, the majority of women (77%, n=53) experienced a latent phase of labor that was more than 8 hours. In contrast, a smaller proportion (23%, n=16) had a latent phase less than 8 hours. Meanwhile, in the multiparous group, a notable shift is observed. A majority of 63% (n=83) of these women also had a latent phase of labor that was more than 8 hours. However, a higher percentage of multiparous women (37%, n=48) experienced a latent phase that less than 8 hours compared to their primiparous counterparts.

This distribution suggests that while the majority of both primiparous and multiparous women tend to have a latent phase of labor of more than 8 hours, a significant portion of primiparous women are more likely to experience a longer latent phase. The P value calculated for the comparison between the two groups is less than 0.05, indicating a statistically significant difference in the duration of the latent phase of labor based on parity. These findings may have important implications for the management of labor and the prediction of neonatal outcomes.

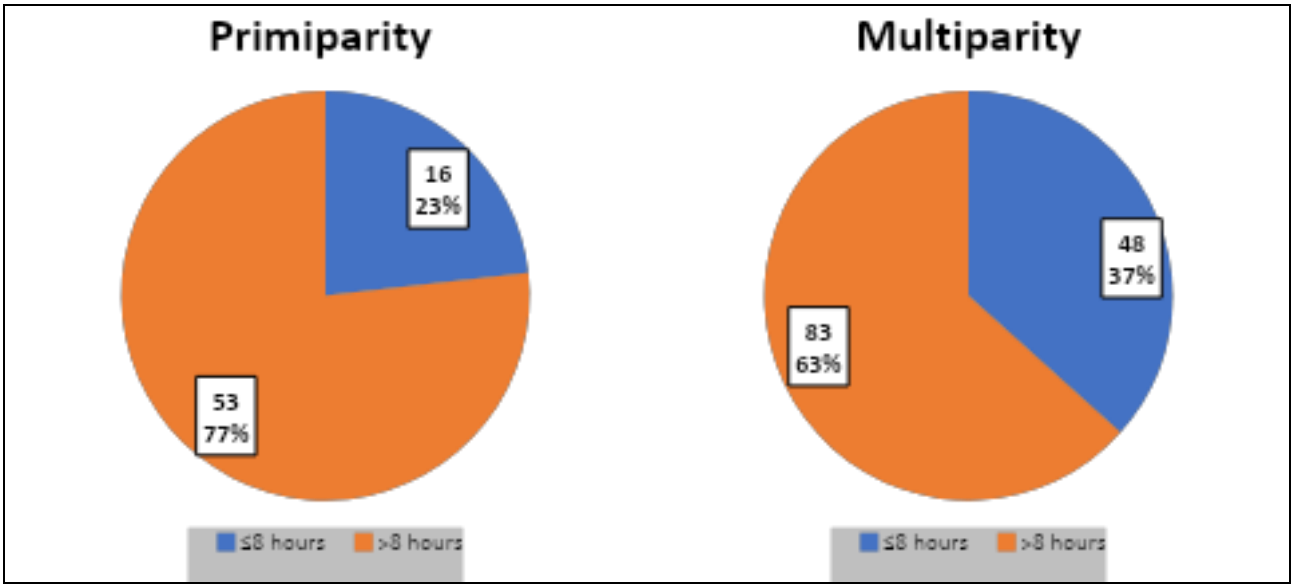

Figure 3-3: Distribution of parity according to presence of prolonged latent phase.

Distribution of parity according to the hours (correlation analysis) show significant negative correlation: the higher the parity the shorter duration of latent phase.

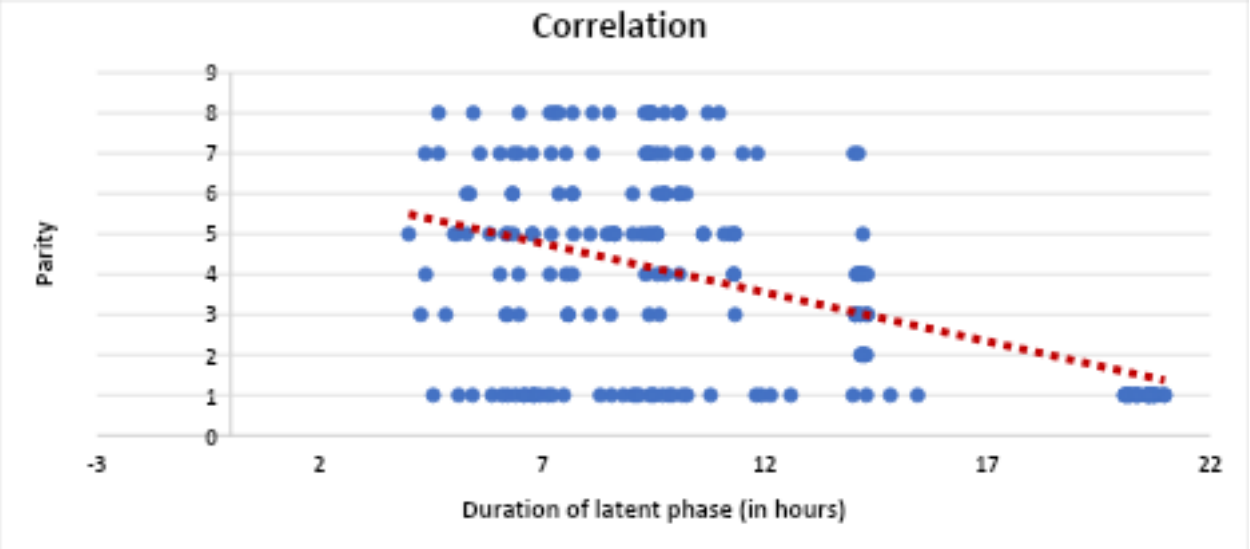

Figure 3-4: Correlation between parity and duration of latent phase.

Regarding cervical dilatation at time of presentation, cases of prolonged labor were more likely to have 1 cm cervical dilatation than those with non-prolonged labor, as shown in Table 3-2

Table 3-2: Distribution of cases according to cervical dilatation at time of presentation.

Cervical dilatation	≤ 8 hours	> 8 hours	P value
	No. (%)	No. (%)	
1 cm	1 (1.6)	45 (33.1)	**0.008**
2 cm	38 (59.4)	76 (55.9)	
3 cm	25 (39.1)	15 (11)	

The fetal heart at time of presentation was not different in regard to duration of latent phase as shown in Figure 3-5.

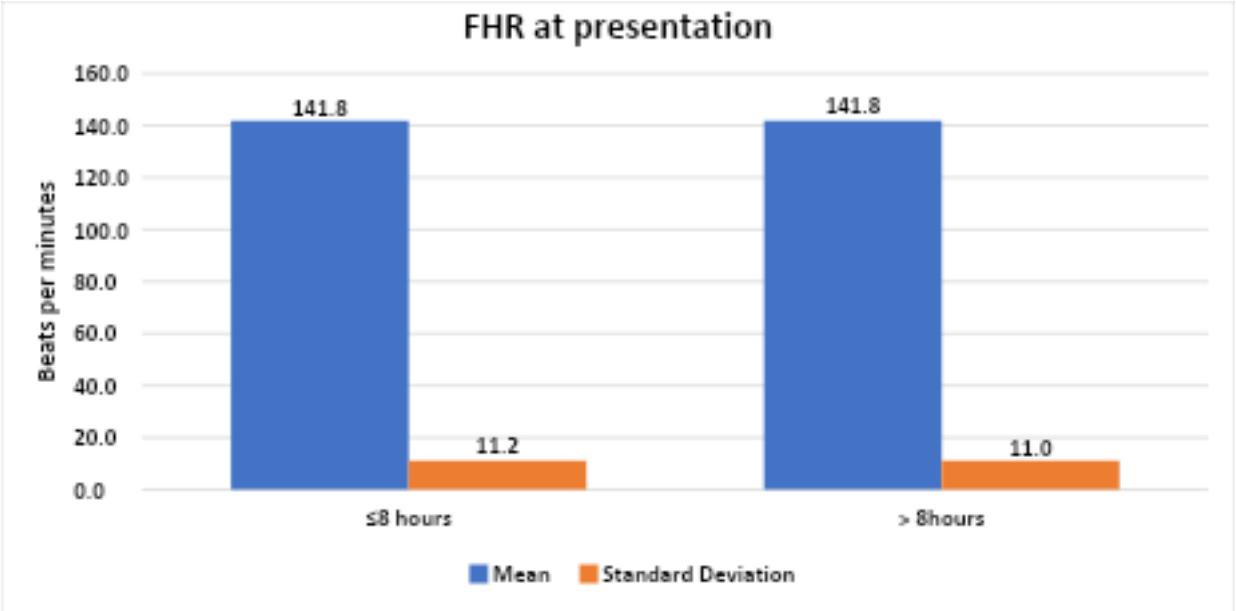

Figure 3-5: Fetal heart rate at presentation.

Table 3-3 presents an analysis of the relationship between the duration of the latent phase of labor and various labor parameters, including the number of contractions at presentation, the duration of the active phase, and the length of the second stage of labor. In the context of labor lasting 8 hours or less, the average number of contractions per 10 minutes was slightly higher at 3.5 (±0.5)

compared to 3.4 (±0.4) for labor exceeding 8 hours, although this difference was not statistically significant (P = 0.523).

The duration of the active phase of labor showed a mean time of 5.07 hours (±1.51) for the ≤8 hours group, whereas the >8 hours group experienced a somewhat prolonged active phase averaging at 5.59 hours (±2.52), approaching statistical significance with a P value of 0.07.

A more pronounced difference was observed in the length of the second stage of labor. Women with a latent phase of 8 hours or less experienced this stage for an average of 38.52 minutes (±8.03), in contrast to those with a latent phase longer than 8 hours, who had a significantly longer second stage, averaging 50.76 minutes (±23.27). The P value for this difference was highly significant at <0.0001, suggesting a substantial association between a longer latent phase and an extended second stage of labor. This result underscores the potential clinical impact of the latent phase duration on the progression and management of the subsequent stages of labor.

Table 3-3: The relation between latent phase, number of contractions at presentation, durations of active phase and second stage of labor.

Variables	≤ 8hours	> 8 hours	P value
	Mean ±SD	Mean ±SD	
No. of contraction per 10 minutes	3.5 ±0.5	3.4 ±0.4	0.523
Duration of the active phase of labor (hr.)	5.07 ±1.51	5.59 ±2.52	0.07
length of the second stage (min)	38.52 ±8.03	50.76 ±23.27	**<0.0001**

In the assessment of liquor status at labor, of the women with a latent phase of 8 hours or less, 10.9% (7 cases) presented with meconium-stained amniotic fluid, whereas a notably higher percentage of 29.4% (40 cases) was observed in women with a longer latent phase, yielding a statistically significant P value of 0.004. Conversely, normal amniotic fluid was reported in 89.1% (57 cases) of the ≤8 hours group compared to 70.6% (96 cases) of the >8 hours group.

When examining the cardiotocography (CTG) results, 82.8% (53 cases) of the women with a shorter latent phase had normal CTG readings. This proportion declined to 62.5% (85 cases) in the group with a longer latent phase. Suspicious CTG readings were slightly more common in the >8 hours group at 20.6% (28 cases) compared to 15.6% (10 cases) in the ≤8 hours group. Pathological CTG findings were significantly more prevalent among women with a latent phase longer than 8 hours, at 16.9% (23 cases), as opposed to a mere 1.6% (1 case) in the shorter latent phase group, which was statistically significant with a P value of 0.003.

In terms of medical interventions (oxytocin) during labor, the difference between the groups was not statistically significant. In the ≤8 hours group, 35.9% (23 cases) required medical interventions, similar to 38.2% (52 cases) in the >8 hours group, reflected by a P value of 0.754.

These labor characteristics suggest a relationship between the duration of the latent phase and the condition of the amniotic fluid and fetal heart rate patterns, as indicated by the liquor status and CTG findings. However, the requirement for medical interventions did not show a significant correlation with the duration of the latent phase.

Table 3-4: Labor characteristics according to duration of latent phase.

Variables		≤ 8hours	> 8 hours	P value
		No. (%)	No. (%)	
Liquor status at labor	Meconium	7 (10.9)	40 (29.4)	**0.004**
	Normal	57 (89.1)	96 (70.6)	
CTG	Normal	53 (82.8)	85 (62.5)	**0.003**
	Suspicious	10 (15.6)	28 (20.6)	
	Pathological	1 (1.6)	23 (16.9)	
Medical interventions (oxytocin)	Yes	23 (35.9)	52 (38.2)	0.754
	No	41 (64.1)	84 (61.8)	

Among women with a latent phase of 8 hours or less, cesarean sections (C/S) were notably infrequent, accounting for only 3.1% (2 cases) of the deliveries. In contrast, the rate of C/S was markedly higher in the group with a latent phase longer than 8 hours, representing 22.8% (31 cases) of that group's deliveries. This difference between the two groups was statistically significant, with a P value of 0.001.

Vaginal deliveries were the predominant mode of delivery for women with a shorter latent phase, constituting 96.9% (62 cases) of the deliveries in this group. On the other hand, the rate of vaginal deliveries decreased to 77.2% (105 cases) in the group with a longer latent phase.

These findings indicate a significant association between the duration of the latent phase and the mode of delivery, with a shorter latent phase correlating with a higher likelihood of vaginal delivery. Conversely, a longer latent phase increases the probability of delivery by cesarean section. This relationship is critical for clinicians to consider when anticipating delivery methods and for informing expectant mothers about potential delivery scenarios.

Table 3-5: Distribution of mode of delivery according to duration of latent phase.

Variables		≤8 hours	>8 hours	P value
		No. (%)	No. (%)	
Mode of delivery	C/S	2 (3.1)	31 (22.8)	**0.001**
	Vaginal	62 (96.9)	105 (77.2)	

Indication of C/S :

Failure to progress 39.4% (13 cases), fetal distress 27.3% (9 cases), meconium stained liquor 33.3% (11 cases).

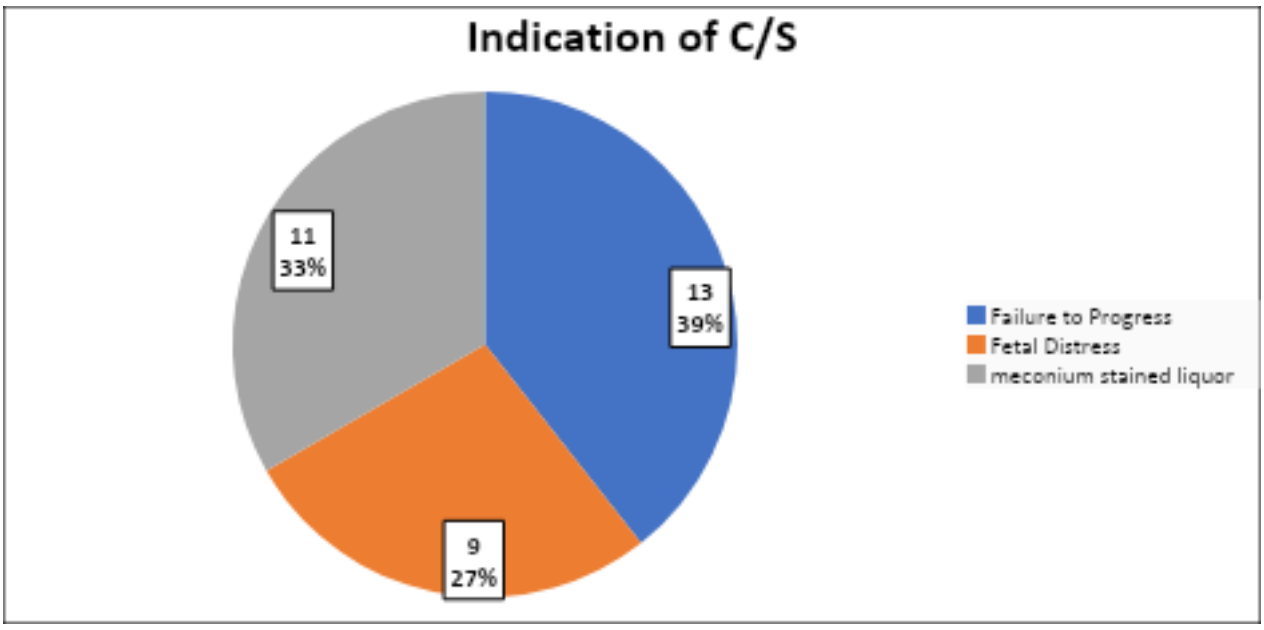

Figure 3-6: Indications of C/S

The group with a latent phase exceeding 8 hours had a marginally higher mean birth weight of 3348.89 grams (SD = 250.82 grams); however, this difference did not achieve statistical significance (P = 0.406).

In terms of neonatal vitality as measured by the Apgar score at 1 minute post-birth, infants born after a latent phase of 8 hours or less had a mean score of 7.83 (SD = 0.81), which was slightly higher than the 7.51 (SD = 0.96) observed in the group with a longer latent phase. This difference reached statistical significance with a P value of 0.017. A similar trend was noted for the Apgar score at 5 minutes, with the ≤8 hours group averaging a score of 9 (SD = 0.78) compared to 8.64

(SD = 0.96) in the >8 hours group, with the difference also being statistically significant (P = 0.005), as shown in Table 3-6.

Table 3-6: Distribution of birthweight and Apgar score according to duration of latent phase.

Variables	≤8 hours	>8 hours	P value
	Mean ±SD	Mean ±SD	
Birth weight	3316.73 ±256	3348.89 ±250.82	0.406
APGAR score 1	7.83 ±0.81	7.51 ±0.96	**0.017**
APGAR score 5	9 ±0.78	8.64 ±0.96	**0.005**

The Apgar score had inverse relationship with duration of latent phase, (i.e., the longer the latent phase the lower Apgar score), as shown in Figure 3-7 and Figure 3-8.

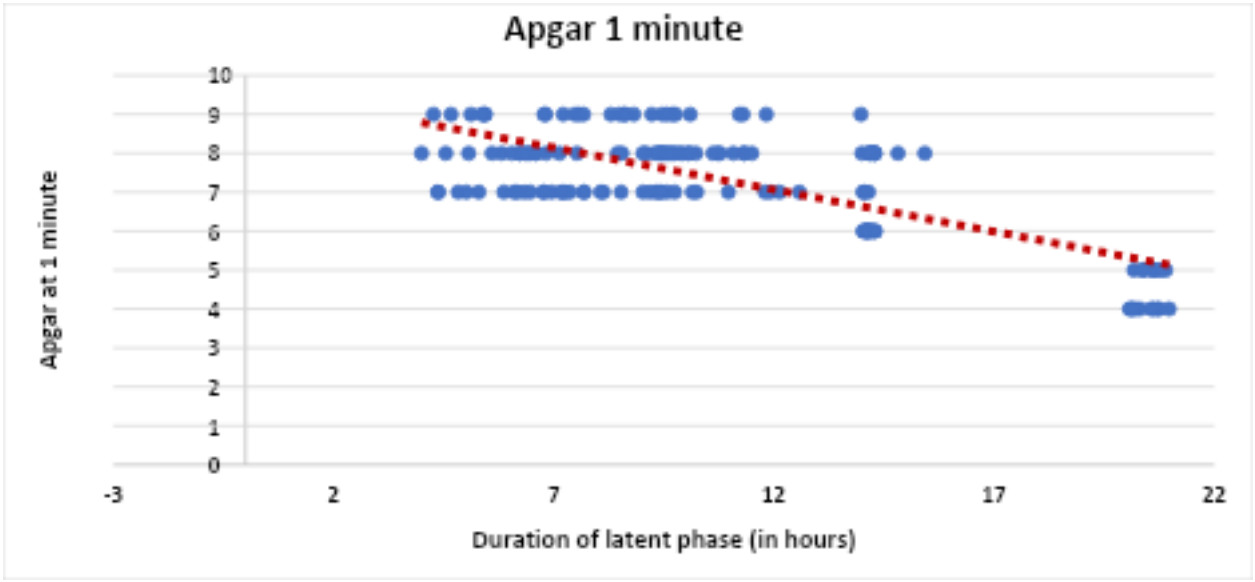

Figure 3-7: Correlation of first minute Apgar score with duration of latent phase.

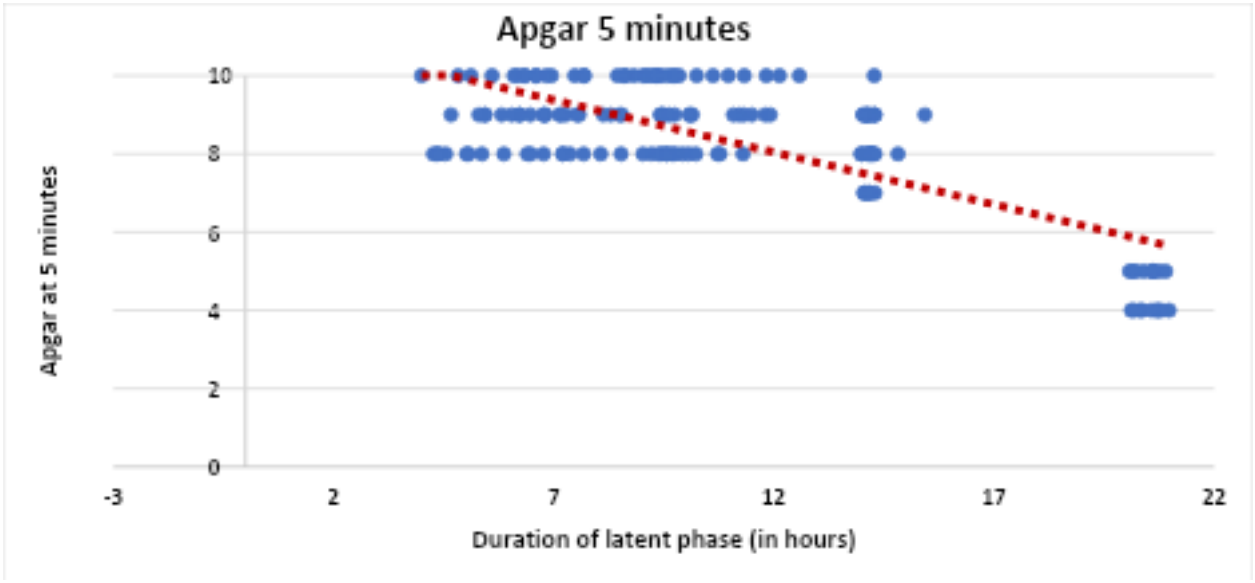

Figure 3-8: Correlation of fifth minute Apgar score with duration of latent phase.

Table 3-7 explores the relationship between the duration of the latent phase of labor and neonatal Apgar scores at 1 and 5 minutes after birth. The data reveals a diverse range of latent phase durations, from 4 to 21 hours, and their corresponding Apgar scores.

At a duration of 4 hours, neonates had a mean Apgar score of 7.75 (±0.96) at 1 minute and 8.5 (±1.0) at 5 minutes. As the duration of the latent phase increased to 10 hours, there was a slight upward trend in the 1-minute Apgar scores, peaking with a mean of 8.15 (±0.55) at 11 hours. The 5-minute Apgar scores also improved, with the highest mean of 9.4 (±0.55) reported at 12 hours.

However, a substantial decline in Apgar scores was noted as the latent phase duration extended beyond 14 hours. For a 20-hour latent phase, the mean Apgar score at 1 minute dramatically decreased to 5.4 (±0.63), and the 5-minute score followed suit with a mean of 5.52 (±0.83). This decline became even more pronounced at 21 hours, with the lowest mean scores of 4.73 (±0.64) at 1 minute and 4.92 (±0.54) at 5 minutes.

Statistical analysis indicates a highly significant correlation between the duration of the latent phase and Apgar scores, with a P value of less than 0.0001 for both 1-minute and 5-minute scores. This suggests that both very short and excessively prolonged latent phases are associated with lower Apgar scores, indicating potential stress on the neonate. Optimal Apgar scores are associated with intermediate durations of the latent phase, which could inform clinical decisions on the timing of interventions during labor.

Table 3-7: Duration of latent phase in hours and Apgar score.

Duration of latent phase		APGAR score 1	APGAR score 5
Hours	No. (%)	Mean ±SD	Mean ±SD
4	4 (2)	7.75 ±0.96	8.5 ±1
5	12 (6)	8.17 ±0.94	8.83 ±0.72
6	20 (10)	7.6 ±0.5	9.2 ±0.77
7	19 (9.5)	7.74 ±0.87	8.95 ±0.78
8	15 (7.5)	7.87 ±0.92	9 ±0.76
9	27 (13.5)	7.93 ±0.78	9.22 ±0.89
10	26 (13)	8.08 ±0.69	8.81 ±0.8
11	13 (6.5)	8.15 ±0.55	9 ±0.91
12	5 (2.5)	7.6 ±0.89	9.4 ±0.55
13	1 (0.5)	7 ±0.0	10 ±0.0
14	26 (13)	6.77 ±0.93	7.92 ±0.86
15	2 (1)	6.94 ±0.75	8 ±0.87
20	13 (6.5)	5.4 ±0.63	5.52 ±0.83
21	17 (8.5)	4.73 ±0.64	4.92 ±0.54
P value		**<0.0001**	**<0.0001**

The low Apgar score (4-5) cases were admitted to NICU and received oxygenation and as indicated CPAP was applied.

Neonatal care unite admission was significantly higher in cases of prolonged latent phase as shown in Table 3-8.

Table 3-8: Neonatal care unit admission according to duration of latent phase.

Variables		≤8 hours	>8 hours	P value
		No. (%)	No. (%)	
NICU	Yes	1 (1.6)	19 (14)	**0.006**
	No	63 (98.4)	117 (86)	

CHAPTER FOUR

DISCUSSION

4. DISCUSSION

The duration of the latent phase of labor has been the subject of extensive study in obstetrics. Research indicates that the median duration of the latent phase can be longer for nulliparous women

compared to multiparous women. It's understood that this phase varies significantly among individuals, influenced by factors such as maternal age, body mass index, and parity. Prolonged latent phases have been associated with an increased likelihood of labor interventions and adverse neonatal outcomes. These findings suggest the need for a more individualized approach to labor management, considering the variability of the latent phase duration and its impact on labor outcomes.

In the current study, 32% of women experienced a latent phase of labor lasting 8 hours or less. Maghoma et al[41] also divided the participants according to duration of latent phase into two groups, those with latent phase lower than 8 hours and those with latent phase more than 8 hours, and found those with prolonged latent phase had more prevalence of adverse maternal and neonatal outcomes. This aligns with the findings of Tilden et al[46] who reported that the median duration of latent phase was 16 hours and cases had duration more than this median were associated with increased neonatal morbidity. While Ängeby et al[20], stated that the prolonged latent phase more than 18 hours associated increased neonatal morbidity. These comparisons suggest a broader range of latent phase durations than traditionally expected, underscoring the variability in labor progression.

The current study used a matched sample in the form of maternal age and body mass index (avoiding the extremes of age or BMI) to minimize the effect of these factors on pregnancy outcome.

Greenberg et al[47] found that younger nulliparous women (aged under 20 years) experience a shorter median first stage of labor (in total) compared to older nulliparous women (over 39 years) by up to 97 minutes. Older women are more likely to experience longer labor and prolonged labor compared to younger women. This result was explained by the increased dysfunctional uterine contraction with age as suggested by Main et al[48].

The effect of BMI was investigated by previous studies and found that Obese women (BMI ≥30 kg/m²) have a longer latent phase of labor. However, there was no significant difference in latent phase duration when labor was induced with oxytocin or in spontaneous labor between obese and normal-weight women, as suggested by Valente et al[49] and found obese patients had interquartile duration of latent phase more than 20.9 hours.

The gestational age was not investigated regarding the duration of latent phase by previous studies. The current study showed a mild difference in gestational age with longer gestational age had longer latent phase probably this related to the fetal size.

The findings from the current study regarding the differences in latent phase duration between primiparous and multiparous women are consistent with the results of the study by Tilden et al[46] observed that nulliparous women had a longer median duration (more than 16 hours) of the latent phase of labor compared to multiparous women.

Additionally, the implications of a longer latent phase, such as increased risks of labor dystocia, interventions, and adverse neonatal outcomes, particularly in nulliparous women, resonate with the results of the current study. This further highlights the influence of childbirth history on the duration of the latent phase and suggests more efficient labor progression in multiparous women due to physiological adaptations from previous births, as suggested by Ashwal et al[50]. These findings collectively emphasize the importance of considering parity in labor management and predicting neonatal outcomes.

The current study's findings, highlighting the higher likelihood of 1 cm cervical dilatation in cases of prolonged latent phase, suggesting that the unfavored cervix is associated with prolonged latent phase. The study conducted by Rouse et al[51] that reported maternal and perinatal outcomes in women undergoing labor induction with an unfavorable cervix found that cervical dilation independently predicted the length of the latent phase of labor.

The current study showed that the fetal heart rate was not different between the two groups. no direct relationship was found in previous studies between the duration of latent phase and fetal heart rate, on the other hand, fetal heart rate could be affected by degree of pain the mother feel and neonatal outcomes rather than the duration of latent phase of labor, as suggested by Woo et al[52].

The number of contractions per ten minutes were not different regarding the duration of the latent phase of labor. This association was not investigated by previous studies.

The duration of active phase of labor was not different in regard to the duration of latent phase, the previous studies did not investigate this relationship and considered the active phase an extension of the latent phase after reaching 4 cm cervical dilatation (both form the first stage of labor).

The current study showed that Women with a latent phase of 8 hours or less experienced this stage for an average of 38.52 minutes (±8.03), in contrast to those with a latent phase longer than 8 hours, who had a significantly longer second stage, averaging 50.76 minutes (±23.27). Similarly found by Tilden et al[53], suggesting that latent phase is linked to both prolonged second stage of labor and adverse pregnancy outcomes.

current study reported that a higher percentage of women with prolonged latent phase presented with meconium-stained amniotic fluid compared to those with a shorter latent phase is statistically significant. This suggests a possible correlation between prolonged latent phases and increased incidence of meconium-stained amniotic fluid. This finding is crucial as meconium-stained amniotic fluid can be an indicator of fetal distress and might necessitate different labor management strategies, as suggested by Tolu[54] The statistical significance of this observation underscores its potential clinical importance in anticipating complications and guiding labor management decisions.

Cases of prolonged latent phase had higher rate of suspicious CTG readings. These findings were not investigated directly in the previous studies, furthermore previous studies suggested that cases of prolonged latent phase associated with increase neonatal complications leading to abnormal CTG readings.

The current study found that a higher rate of C/S found in cases with prolonged latent phase. This result was supported by the findings of Albassam et al[55] and Tilden et al[46]. This result probably attributed to the higher rate of failure to progress or development of abnormal CTG findings. The higher rate of C/s was mainly due to several causes (failure to progress, fetal distress, and muonium liquor). Rota et al[4] found that cases of prolonged latent phase associated with adverse maternal outcome and increased rate of C/S. this increased rate of C/S is attributed to common process that lead to prolongation of latent phase, as suggested by Rota et al[4].

The current study did not find a relation between birthweight and duration of latent phase of labor, although previous studies suggested that labor tend to be prolonged in cases of macrocosmic baby, as suggested by Siggelkow[56]. Which was not common in the current study especially due to exclusion of diabetic mother form the study. Birthweight was not different between those with prolonged and non-prolonged latent phase of labor. Similar result found by Maghoma et al[41].

The Apgar score at birth and after five minutes was significantly lower in cases of prolonged latent phase. The observation of Apgar score according to hourly distribution of latent phase showed significant negative correlation, suggesting decrease the mean Apgar score with the prolongation of the latent phase of labor. Similar result found by Ängeby et al[20] and Cheng et al[57]. A longer latent phase can be associated with increased maternal and fetal stress. This stress may lead to changes in fetal physiology, such as decreased oxygenation or altered blood flow, potentially impacting the newborn's condition at birth. Additionally, prolonged labor might lead to interventions like oxytocin use or cesarean delivery, which could also influence neonatal outcomes and Apgar scores.

Cases of prolonged latent phase had higher rate of NICU admission, similarly found by Ängeby et al[20] and Cheng et al[57]. This increased rate can be explained that a longer latent phase can lead to fetal distress, indicated by factors like meconium-stained amniotic fluid and abnormal

cardiotocography readings. This distress can result in conditions necessitating NICU care, such as respiratory issues or low Apgar scores. Additionally, interventions during a prolonged labor, such as cesarean delivery, might also contribute to the need for NICU support post-delivery.

CHAPTER FIVE

CONCLUSION & RECOMMENDATIONS

5. Conclusion

- Prolonged latent phase (>8 hours) correlates with more pathological cardiotocography findings, and it is linked with increased caesarean section rates.
- Higher occurrence of meconium-stained amniotic fluid observed with longer latent phase.
- Neonates from extended latent phases show lower Apgar scores at 1 and 5 minutes, indicating increased stress.
- These findings emphasize the need for careful monitoring of the latent phase's duration in predicting and managing labor and neonatal outcomes.

6. Recommendations

- **Early Intervention:** more study to Consider the value of early medical intervention for labors with a latent phase exceeding 8 hours to reduce complications.
- **Enhanced Monitoring:** Increase monitoring of fetal well-being by CTG and maternal status during prolonged latent phases.
- **Patient Education:** Educate expectant mothers about the potential risks associated with a prolonged latent phase.
- **Research Continuation:** Encourage further research to explore more in-depth the consequences of a prolonged latent phase and effective management strategies.
- **Policy Review:** Review and possibly revise labor management protocols to account for the duration of the latent phase and its implications on neonatal outcomes.

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