



**THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE**

**FETAL OUTCOMES IN ANTENATAL WOMEN ADMITTED
WITH A DIAGNOSIS OF PROLONGED LATENT PHASE OF
LABOUR AT UNIVERSITY TEACHING HOSPITAL LUSAKA**

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DEDICATION

I dedicate this piece of work to my loving parents and brothers Mohamed Fareed and Mohamed Faraaz for your love, support and understanding that has helped me overcome the many challenges during my journey to completion of this work. I also dedicate this to my loving sister Zahira and Hassan Fayaad who have always believed in me.

Above all, I thank the Lord almighty for the strength and wisdom that enabled me to successfully complete this dissertation.

DECLARATION

I **DR. NUSRAAT GANGAT** HEREBY DECLARE THAT THIS DISSERTATION HEREIN PRESENTED FOR THE DEGREE OF **MASTER OF MEDICINE (OBSTETRICS AND GYNAECOLOGY)** HAS NOT BEEN PREVIOUSLY SUBMITTED EITHER IN WHOLE OR IN PART FOR ANY OTHER DEGREE AT THIS OR ANY OTHER UNIVERSITY, NOR BEING CURRENTLY SUBMITTED FOR ANY OTHER DEGREE.

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I HEREBY STATE THAT THIS DISSERTATION IS ENTIRELY THE RESULT OF MY OWN PERSONAL EFFORT. THE VARIOUS SOURCES TO WHICH I AM INDEBTED HAVE BEEN CLEARLY INDICATED IN THE BIBLIOGRAPHY AND ACKNOWLEDGEMNT.

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ABSTRACT

Background: The latent phase of labour is poorly understood and duration of this phase is significantly difficult to measure. Prolonged latent phase (PLP) accounts for abnormalities in both nulliparous and multiparous mothers and is associated with increased risks of obstetric interventions and poor fetal outcomes.

Objectives: This study aimed to determine fetal outcomes in women admitted with a diagnosis of PLP at the UTH.

Methods: A case control study of ratio 1:1 comprising 171 women with PLP and 168 with normal labour was examined at the UTH from July 2015 to October 2015. An investigator administered questionnaire was used to collect data along with medical records of neonates and mothers. Bivariate analysis and multiple logistic regression was carried out to compare fetal outcomes in cases and controls.

Results: There were 12.3% admissions to NICU from among women with PLP and none from controls (with normal labour). Furthermore, 9.9% of newborns with Apgar score < 7 were in women with PLP and 1.2% in controls. Caesarean section and post-partum hemorrhage was more frequent in women with PLP than controls: 15 (8.8%) vs. 2 (1.2 %) and (5.8% vs. 1.2%) respectively. Moreover, younger mothers had marginally higher odds of PLP [Odds Ratio (OR) 1.10, 95% CI 1.05 – 1.15, P-value < 0.01] and women with parity 0 had over 12 times increased odds for PLP (OR 12.29, 95% CI 4.62 – 32.67, P-value < 0.01).

Conclusion: This study has shown that prolonged latent phase of labour is a predictor of labour dystocia and neonatal morbidity. It is manifested by higher intervention rates such as augmentation and operative deliveries amongst women with PLP than controls. Babies delivered following PLP require more neonatal attention than controls. Therefore, all women with PLP should be referred to UTH to reduce on morbidity and mortality.

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ABBREVIATIONS/ACRONYMS

APH	-	Antepartum Hemorrhage
BA	-	Birth Asphyxia
BOH	-	Bad Obstetric History
CHTN	-	Chronic Hypertension
CPD	-	Cephalo Pelvic Disproportion
DM	-	Diabetes mellitus
FAS	-	Fetal Apgar score
HIV	-	Human Immunodeficiency Virus
HTN	-	Hypertension
IUFD	-	Intra Uterine Foetal Death
NICE	-	National Institute of Clinical Excellence
NICU	-	Neonatal Intensive Care Unit
PE	-	Pre-Eclampsia
PIH	-	Pregnancy Induced Hypertension
PLP	-	Prolonged Latent Phase of Labour
PPH	-	Postpartum Hemorrhage
PROM	-	Premature Rupture of Membranes
PTL	-	Pre Term Labour
UNZABREC	-	University of Zambia Biomedical Research Ethics Committee
UTH	-	University Teaching Hospital
WHO	-	World Health Organization

1.0 INTRODUCTION

At the University Teaching Hospital (UTH), between eighty to hundred patients are seen daily on the labour ward in the Department of Obstetrics and Gynecology. Of these, 87% are referred to the UTH from twenty-four surrounding midwifery-led clinics for various obstetrical and medical complications such as Prolonged Latent Phase (PLP), 'big baby', raised blood pressure, intra uterine fetal death (IUFD), fetal distress and many others. Referrals due to PLP comprises 25% to 30% of this case load.

Latent phase of labour is complex and not fully understood but is defined by The United Kingdom (UK) National Institute of Clinical Excellence (NICE) as a period of time, not necessarily continuous, when there are painful contractions and there is some cervical change, including cervical effacement and dilatation up to 4 cms.¹ Studies often ignore evaluation of this phase of labour as determination of onset of labour is subjective.² Duration of latent phase is particularly difficult to measure, as women experience the onset of labour in a variety of ways.³

In practice, many clinicians prefer to record the length of latent phase from time of admission of women to the labour ward. On this basis, latent phase duration of 8 hours or more has been arbitrarily defined as prolonged. However, some authors have defined prolongation as over 12 hours in nulliparous and 6 hours in multiparous women before active phase of labour.²

The latent phase usually has its onset at the pregnant woman's home.⁴ Normally, the length of latent phase should ideally be measured from the time of onset of painful and regular uterine contractions felt by the woman to the onset of the active phase recorded in the labour ward. Due to difficulties in measuring the exact duration of latent phase of labour, Friedman led to a description of latent phase of greater than 20 hours as abnormal in nulliparous and greater than 14 hours as abnormal in multiparous mothers.⁵ Philpott and Castle in Southern Africa, considered latent phase to be prolonged when it exceeds 8 hours.⁶

Women experience onset of labour in a variety of different ways.³ A study by Gross et al suggests that for many women, the onset of regular contractions does not coincide with what they perceive to be their onset of labour.³ Cervical anatomy at labour onset is also highly variable from woman to woman.⁷ The way in which women experience the onset of labour has not been found to be associated with the duration of labour following admission to hospital.³ The latent phase of labour and its impact on labour as a whole is poorly understood by and large and therefore the duration of this phase is particularly difficult to measure.⁸

Prolonged latent phase is responsible for 30% of labour abnormalities in nulliparous and over 50 % of such abnormalities in multiparous mothers. A study by Chelmow et al in Boston, USA, showed that prolonged latent phase of labour is associated with increased risk of obstetric intervention and poor fetal outcome such as need for augmentation, caesarean delivery, low Apgar score, and admission to neonatal unit respectively.²

A study done in Nigeria showed that labour augmentation, caesarean delivery and increased blood loss at delivery were higher in mothers with prolonged latent phase of labour, along with increased neonatal admission.⁹ Prolonged latent phase of labour was also a predictor of labour dystocia and neonatal morbidity.⁹

A study by Maghoma and Buchmann in South Africa showed similar results as Chelmow et al confirming that prolonged latent phase is associated with increased risk of obstetrics interventions and poor fetal outcomes.¹⁰ The optimal management of prolonged latent phase is still unknown and requires further studies by means of randomised controlled trials. There are few published works on prolonged latent phase of labour worldwide and none from Zambia. Indeed, the magnitude of latent phase and maternal and fetal outcomes of prolonged latent phase of labour in Zambia is unknown. This study endeavoured to explore fetal outcomes of prolonged latent phase of labour at the University Teaching Hospital in Lusaka.

2.0 LITERATURE REVIEW

Studies of prolonged latent phase of labour are complicated by difficulties of measurement and definition. Surprisingly, there has been little data published on the outcomes associated with prolonged latent phase of labour globally. No randomised controlled trials have been reported on the management of prolonged latent phase of labor so far. Currently, most useful studies are those of Chelmow et al (1993), Maghoma and Buchmann (2002), Michael et al (2005), World Health Organization (WHO), Partograph study, (World Health Organization Maternal Health and Safe Mother Hood Program 1994) and collaborative perinatal project (Hardy 1987); all of which are descriptive or at best cohort studies.^{2, 9, 10, 11, 12} The latent phase of labour frequently causes difficulties with recognition and definition and its management remains controversial. Friedman who clearly defined latent phase of labour observed that latent phase labour of nulliparous women tends to be longer than in multiparous women.^{5, 7}

To date very few studies have been done to describe the prolonged latent phase of labour and its associated complications. From the few studies done, from various regions, it showed difference in both maternal and fetal outcomes and different interventions done in women with prolonged latent phase. Some studies also showed an association of prolonged latent phase with prolonged active phase of labour whereas others did not.^{4, 8, 13} Other studies have shown that mothers with prolonged latent phase should be left alone because the outcome might still be good.^{5, 13} On the other hand, there are studies showing that intervention is needed to prevent bad outcomes to both mothers and babies.^{2, 6}

In an American cohort, the incidence of prolonged latent phase of labour was found to be 6.4% whereas according to the WHO study in the South East Asia, the incidence was found to be 1.9%.^{2, 11} The study by Chelmow et al conducted in the USA found an associated prolongation of active phase of labour in women with prolonged latent phase while the study by Boylan et al on active management of prolonged latent phase of labour did not find any related effects on the length on the active phase of labour.^{2, 13} Obstetric complications related to prolonged latent phase have been described by Chelmow, especially increased caesarean section rates and perinatal asphyxia. Some

obstetricians in the USA differentiate between nulliparous and multiparous patients and recommend intervention after 12 hours and 6 hours respectively in the form of amniotomy, augmentation, prostaglandins and caesarean delivery.^{2, 14}

Chelmow et al in their study challenged this premise, finding an association between prolonged latent phase and subsequent labour abnormalities and the need for caesarean section. However, this was a retrospective study that did not use a standardised definition of labour onset on arrival at hospital.² In their prospective observational study of 2,072 Swedish primiparous women with an uncomplicated pregnancy, Dencker et al found that a prolonged latent phase of over 12 hours was associated with a significantly longer duration of active labour.¹⁴ A limitation of this study was that it required women to identify the onset of their latent phase of labour, which is difficult to define.

A study by Maghoma and Buchmaan in South Africa found that prolonged latent phase of labour is associated with increased risks of obstetric interventions and poor fetal outcomes.¹⁰ One hundred and fifty cases were compared with hundred controls. Oxytocin augmentation was required in 62% of cases while caesarean section was done in 29% of them. Thick meconium stained liquor was more in cases at 15%, the 5 minute Apgar score less than 7 was found in 17% of the cases and admission to neonatal unit was found to be 22% in cases.¹⁰ In a study done in Nigeria Aziken et al showed that labour augmentation, caesarean delivery and increased blood loss at delivery were higher in mothers with prolonged latent phase of labour, along with increased neonatal admissions.⁹ They concluded that prolonged latent phase of labour is a predictor of labour dystocia and neonatal morbidity.

Chelmow in USA, Maghoma and Buchmaan in South Africa and Aziken et al in Nigeria demonstrated similar findings of adverse outcomes associated with prolonged latent phase and showed a dose response effect with a greater duration; leading to more complications with a longer prolonged latent phase, and predominantly a problem of nulliparous women. Thus, they also recommended interventions in mothers with prolonged latent phase of labour.^{2, 7, 10} Other findings are that maternal risks of duration of the first stage greater than the 95th percentile (>30 h) is associated with a higher caesarean delivery rate (adjusted odds ratio [aOR] 2.28) and chorioamnionitis (aOR

1.58). Neonate risks are associated with a higher incidence of neonatal intensive care admissions in the absence of any other major morbidities (aOR 1.53).^{2, 9, 10}

Analysis of the National Collaborative Perinatal Project by Hardy showed a variety of perinatal and developmental outcomes in a dose response effect.¹² Latent phase of more than 12 hours was associated with 2.5-fold increase in risks of neonatal death, 1.6-fold increase in 1 minute Apgar score less than 6, and a 2.2 fold greater risks of 5 minute Apgar score less than 6.

In studies examining developmental outcomes, it was found that latent phase of more than 10 hours in multipara women showed a two to four times increased risks of stillbirth, perinatal mortality, neonatal death, and low 1 minutes and 5 minute Apgar score. Latent phase greater than 15 hours in multiparous women showed long term sequelae such as decreased mental, motor and global assessment at 8 months of age, abnormal neurological examination at 1 year and abnormal speech, language and hearing at age 3 years.^{12, 15, 16} Similar analysis in nulliparous women showed a two times risk of depressed Apgar score and abnormalities associated at 1 and 3 years of age with latent phase of 12 to 18 hours.¹⁶ A latent phase of greater than 18 hours is associated with significantly elevated risks of neonatal death, perinatal mortality, low Apgar score, developmental and neurological abnormalities at ages 1, 3 and 7 years.¹⁶ However, this study did not assess the maternal outcomes. Nonetheless, it was shown that patients with prolonged latent phase of labour were 2.6 times more likely to have further labour abnormalities and three times more likely to require caesarean for delivery, even after controlling for other risk factors for caesarean such as parity, macrosomia and epidural anaesthesia.¹⁶

By contrast, a study done in Zimbabwe showed that prolonged latent phase is a benign condition with no maternal and perinatal complications.⁵ Mothers were left alone with no interventions other than monitoring fetal heart and progress of labour by Friedman et al⁵. In another study it was shown that positive interventions such as providing emotional and psychological support to mothers with long labour resulted in good outcomes and no adverse outcomes were recorded.¹

The extent to which ‘prolonged latent phase’ means anything in terms of adverse outcomes remains a subject of disagreement by Austin and Calderon.¹⁷ A prolonged latent phase can often be a discouraging and exhausting experience and women clearly need good psychological support.^{3,8} This principle is reinforced by Nolan et al who found that women who felt ‘happy’ and ‘excited’ during the latent phase of labour were more likely to have a spontaneous vaginal delivery than any interventions.¹⁵ Whilst this does not prove causation, the association between positive feelings during the latent phase and improved birth outcomes is important for midwives to consider when caring for women.⁸ This theory was previously tested by Hodnett et al in their international randomised controlled trial of a formalised approach to care in the latent phase of labour; which included interventions to help women stay positive.¹⁶ Whilst it did not reach statistical significance, use of the interventions did suggest a modest increase in the spontaneous vaginal birth rate, compared to standard care.¹³ The only studies available on this subject are from Nigeria and South Africa. As stated earlier, there are no such studies accessible in Zambia on this subject.

3.0 STATEMENT OF PROBLEM

Prolonged latent phase is associated with increased risks for obstetric interventions such as augmentation, caesarean delivery, and longer hospital stay. It is also associated with poor fetal outcomes and the need for neonatal resuscitation increases. On average 25 – 30% of the referrals to UTH are due to prolonged latent phase of labour. The fetal outcomes in these patients are either largely unknown or not studied at all. Complications arising from prolonged latent phase of labour significantly contribute to maternal and fetal morbidity and mortality.

The presence of prolonged latent phase should therefore alert the clinician to an increased risk for further problems during the labour. Risk factors once identified can help midwives and clinicians to be more vigilant with patients experiencing prolonged latent phase of labour. Such a precaution will help to reduce on fetal complications such as asphyxia, low Apgar score at delivery and admissions to neonatal unit.

4.0 STUDY JUSTIFICATION

As there have been no studies on prolonged latent phase of labour in Zambia, the risk of poor fetal outcomes associated with prolonged latent phase of labor at UTH remains unknown despite large volumes of patients referred for this condition. Investigating prolonged latent phase will assist in recognising the risks and in developing strategies aimed to reduce the poor outcomes. It is thus important to know the magnitude of prolonged latent phase of labour.

The study attempted to fill in gaps identified in the review of literature. The findings from this study will help guide future medical researchers on this subject.

5.0 STUDY QUESTION

Is prolonged latent phase of labour associated with an increased risk of poor fetal outcomes at the University Teaching Hospital (UTH)?

6.0 STUDY OBJECTIVES

6.1 Overall objective

To study fetal outcomes in women admitted with a diagnosis of prolonged latent phase of labour at UTH.

6.2 Specific objectives

1. To determine the fetal outcomes associated with prolonged latent phase of labour.
2. To determine socio-demographic and pregnancy factors in mothers that have prolonged latent phase of labour.

7.0 METHODOLOGY

7.1 Study design: This was a case control study in the ratio of 1:1.

7.2 Site: The study was conducted at the University Teaching Hospital, a tertiary hospital and referral centre in Lusaka, Zambia. Specifically, the study was conducted at the labour ward from July 2015 to October 2015.

7.3 Target population: All women giving birth at UTH labour ward.

7.4 Study population: Women at term with prolonged latent phase of labour who met the eligibility criteria for cases; and every pregnant woman at term without prolonged latent phase of labour who met eligibility criteria for controls.

7.5 Inclusion criteria for cases:

- a. Singleton pregnancy
- b. Term pregnancy (>37 completed weeks)
- c. Cephalic presentation
- d. Live baby at presentation
- e. Diagnosis of prolonged latent phase
- f. Women who gave consent

7.6 Exclusion criteria for cases:

- a. Previous caesarean section
- b. Risks of poor maternal and fetal outcomes like chronic hypertension (CHTN), severe pre-eclampsia (SPE) Diabetes mellitus (DM) and other medical conditions).
- c. Premature rupture of membranes (PROM), chorioamnionitis
- d. Unable to provide consent for the study/ not willing to participate in the study.

7.7 Inclusion criteria for controls:

- a. Singleton pregnancy
- b. Term pregnancy (>37 completed weeks)
- c. Cephalic presentation
- d. Live baby at presentation
- e. No prolonged latent phase of labour
- f. Women who gave consent

7.8 Exclusion criteria for controls:

- a. Previous cesarean section
- b. Risk of poor maternal and fetal outcomes like CHTN, SPE, DM, other medical conditions)
- c. PROM, Chorioamnionitis
- d. Unable to provide consent for the study/ not willing to participate in the study.

7.9 Sample size calculation and sampling method:

The sample size was calculated using OpenEpi software and formula by Kelsey *et al* with 80% power. This sample size is based on the hypothesis that 15 percent of cases will have poor fetal outcomes, compared to 6 percent of controls. The sample size was 171 women as cases and 171 women as controls.

Cases (women with prolonged latent phase of labour) were enrolled by probability based sampling getting 3 to 5 cases per day using systemic random sampling.

Controls were women with no prolonged latent phase of labour enrolled from the list of deliveries by simple random sampling choosing every third control from the labour ward admission register.

7.10 Recruitment Procedure

Participants were recruited over 4 months following research ethics clearance. For both cases and controls demographic data, obstetric history, duration of labour, interventions done, mode of delivery, and fetal outcomes (Apgar score, birth weight, admission to NICU and stillbirth) were ascertained through an interviewer administered questionnaire and from the ante-natal card and obstetric file review and neonatal records (Appendix I). The collection of data was done by the researcher with the help of two midwife assistants. To minimize errors, double entry of data was done along with range and consistency checks. Data obtained from both arms was compared to determine any associated factors for poor fetal outcome in the two groups.

7.11 Data Analysis

Data was entered in Excel and exported to SPSS version 21 for analysis.

Descriptive data: Continuous variables were described using means and/or median (and interquartile ranges). Categorical variables were described using proportions or percentages.

Analytical data: Results were presented as percentages, proportions, and means of various outcomes along with 95% confidence interval. Bivariate analysis was done comparing fetal outcomes in cases and controls. Data was dichotomized and binary logistic regression was used to compare outcomes in cases and controls. Crude and adjusted odds ratio were calculated and chi square test was used to study association between categorical variables. In all cases $P < 0.05$ was considered significant. Odds for the outcomes for the controls and cases were calculated and compared using odds ratio. The Pearson's chi-squared test was used for comparison of proportions between groups. Both SPSS and MS Excel were utilized for analysis and graphical output. Study variables were checked for evidence of collinearity based on Pearson and Spearman correlation coefficients. The relationship between study variables and PLP was examined using logistic regression. Selection for logistic regression model was considered at level $P < 0.20$ or known clinical significance. Backward selection method was used to obtain the final logistic regression model.

7.12 Ethics Considerations

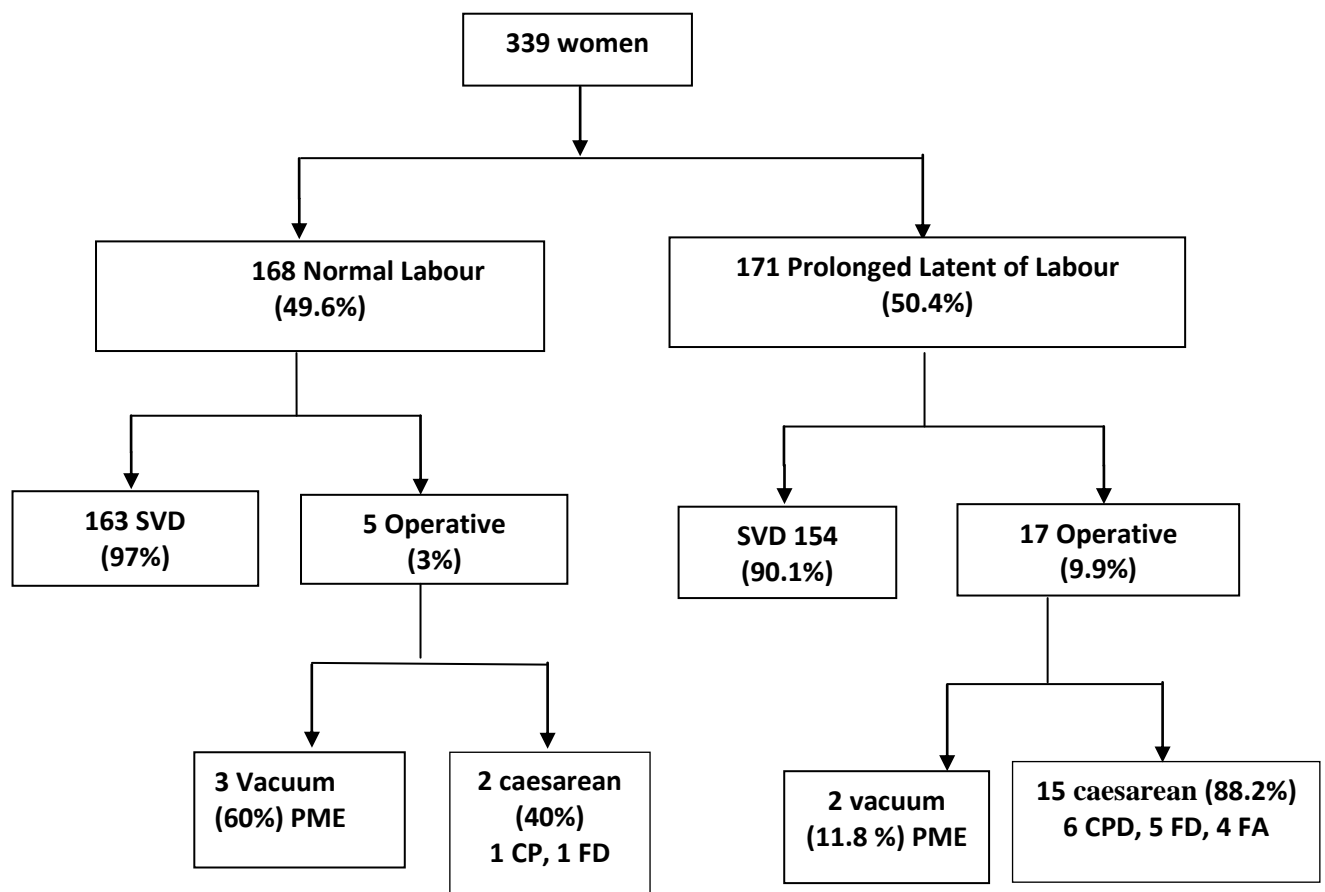
Ethics approval was sought and obtained from the University of Zambia Biomedical Research Ethics Committee (UNZABREC) (Appendix II). Every participant was fully informed of the study and risks involved and written consent was obtained by either a signature or thumb print (Appendix III). Participants were notified that they were free to withdraw their participation at any point. Withdrawal from the study did not in any way affect their regular medical management. Records were kept confidential, and reviewed only by the researcher and/or Supervisor. Information obtained from these records was used solely for the purposes of this research. Permission to carry out the study was sought from the University Teaching Hospital Medical Superintendent (Appendix IV), Head of Department Obstetrics and Gynecology and the Labour Ward Sister-in-charge.

8.0 RESULTS

8.1. Study participants

There was a total of 339 women studied and the breakdown of both cases (those with prolonged latent phase) and controls (normal labour) is summarized in Figure 1.1 and includes delivery details. Data in three participants with normal labour were incomplete and are excluded. Hence, there were 168/339 (49.6%) with normal labour and 171/339 (50.4%) with prolonged latent phase (PLP) labour. The majority of the women delivered vaginally with normal labour and only 5 (3%) underwent operative delivery, whereas 17 (9.9%) with prolonged latent phase underwent operative deliveries of which 15 (88%) were caesarean sections.

Figure 1.1: Flow chart of study participants



KEY

- CP: Cord prolapse
- CPD: Cephalo pelvic disproportion
- FA: Failed augmentation
- FD: Fetal distress
- PME: Poor Maternal Effort

8.2 Sociodemographic characteristics

The sociodemographic characteristics of all women stratified by normal labour (controls) and those with prolonged latent phase (cases) are tabulated in Table 1.1. The mean age of the women studied was 25.3 years in women with normal labour and 24.1 years in women with prolonged latent phase of labour. The minimum age was 15 years and maximum age 42 years. There were 46 (26.9%) single mothers and 125 (73.1%) married mothers in cases which is similar to control group of 42 (25%) single and 126 (75%) married mothers. Over half of the women in both prolonged latent phase of labour (100, 58.5%) and normal labour (93, 55.4%) had secondary level education. A greater majority of the women were unemployed; cases 145 (84.8%) controls 141 (83.9%). Only 26 (15.2%) and 27 (16.1%) were employed in cases and controls respectively.

Table 1.1 Sociodemographic characteristics of the study participants stratified by normal labour (controls) and prolonged latent phase of labour (cases)

Variable	Normal Labour (Controls) N=168		PLP Labour (Cases) N= 171	
	N	%	n	%
Age (years)				
Mean, SD	25.3; 6.89		24.1; 5.77	
<20	39	23.2	34	19.9
20-24	48	28.6	75	43.9
25-29	35	20.8	35	20.5
30-34	24	14.3	15	8.8
>35	22	13.1	12	7.0
Marital status				
Unmarried	42	25.0%	46	26.9%
Married	126	75.0%	125	73.1%
Education				
Up to Primary	75	44.6%	71	41.5%
Secondary or better	93	55.4%	100	58.5%
Employment				
Unemployed	141	83.9%	145	84.8%
Employed	27	16.1%	26	15.2%

8.3 Pregnancy Characteristics

Pregnancy characteristics are tabulated in Table 1.2. Overall there were more primigravida's with both normal labour 68 (40.5%) and prolonged latent phase of labour 88 (51.5%) than women with gravidity 2 and more. Only 15 (8.8%) were gravida 4 and more with PLP as compared to women with normal labour of 41 (24.4%). Similarly, there were more women with parity zero than para 1 and above in both groups of women with normal labour and PLP.

A much greater proportion of the women 323/339 (95.3%) had not had a stillbirth in previous pregnancy. There were 7 (4.2%) and 9 (5.3%) women with previous stillbirth in normal labour and PLP respectively. There were 69/339 (20.4%) women with positive HIV status of which 30 (18%) were from the controls and 39 (23.8%) from cases.

The majority of the women had 3 or 4 antenatal visits. Of the women with normal labour 98 (58.3%) had 3 to 4 antenatal visits and 119 (69.1%) from the PLP group had 3 to 4 antenatal visit. Very few women 58/339 (17.1%) had more than 4 antenatal visits in both arm.

The larger majority of the women, over 90 % were referred from a clinic; less than 10% were self-referred in both arms. The main reason for referral for the majority of the women was prolonged latent phase of labour (34.2%) followed by big baby (20.9%), and other reasons such as bad obstetrics history, postdates, medical condition in pregnancy accounting for less frequency. The mean gestation age was 39.4 weeks (SD = 1.30) in both arms. The minimum gestation age was 37 weeks and maximum 44 weeks.

Table 1.2 Pregnancy characteristics of the study participants stratified by normal labour (controls) and prolonged latent phase of labour (cases)

Variable	Normal Labour (Controls) N=168		PLP Labour (Cases) N= 171	
	N	%	n	%
Gravidity				
1	68	40.5%	88	51.5%
2	35	20.8%	41	24.0%
3	24	14.3%	27	15.8%
4+	41	24.4%	15	8.8%
Parity				
0	64	38.1%	85	49.7%
1	36	21.4%	43	25.1%
2	25	14.9%	28	16.4%
3+	43	25.6%	15	8.8%
No. of stillbirths in previous pregnancy				
0	161	95.8%	162	94.7%
1+	7	4.2%	9	5.3%
HIV status				
Negative	137	82.0%	125	76.2%
Positive	30	18.0%	39	23.8%
No. of antenatal visits				
0-2	36	21.4%	28	16.4%
3	51	30.4%	57	33.3%
4	47	28.0%	62	36.3%
5+	34	20.2%	24	14.0%
Referral status				
Self	13	7.7%	8	4.7%
Clinic	155	92.3%	163	95.3%
Gestation age				
Mean, SD	39.4; 1.20		39.4; 1.38	

8.3 Labour Characteristics and Outcomes

Labour characteristics are tabulated in table 1.3. Majority of the women 88 (52.4%) with normal labour had between 0 and 2 vaginal examinations as compared to women with prolonged latent phase where only 21 (12.3%) had 0 to 2 vaginal examinations. However, on the other hand more women had than 5 or more vaginal examinations amongst the cases than controls [58 (33.9%) vs 3 (1.8%)].

A greater majority of the women, 317/339 (93.5%), delivered by spontaneous vaginal delivery (SVD). Amongst the controls there were 163 (97%) and 154 (90.1%) from cases that delivered vaginally. There were 17 (9.9%) women with prolonged latent phase of labour who had operative delivery as compared to 5 (3.0%) women with normal labour. Of the operative deliveries there were 3 (18%) by vacuum in women with normal labour as compared to 2(1.2%) in women with PLP. The indication for all vacuum delivery being poor maternal effort. On the other hand, there were more caesarean sections amongst the cases of 15 (8.8%) than control 2 (1.2%). The indication for operative delivery amongst the cases were 6 (40%) CPD, 5 (33.3%) fetal distress and 4 (26.7%) failed augmentation. Whereas the indications for caesarean deliver amongst the control group were 1 (50%) cord prolapse and 1 (50%) fetal distress. There were 10 (5.8%) mothers whose delivery was complicated by PPH amongst the cases as compared to 2 (1.2%) mothers who had normal labour.

There were 21 (12.3%) admissions to NICU all of which were from prolonged latent phase of labor and none from women with normal labour. Of the 21 babies admitted to NICU 3 (14.2%) were delivered by caesarean section and 18 (85.7%) by SVD. Reasons for NICU admission were; mild birth asphyxia (BA) in 3/21 (14.3%), moderate BA in 8/21 (38.1%), severe BA in 7/21 (33.3%), grunting respiration in 2/21 (9.5%), and raised temperature in 1/21 (4.8%). Of the caesarean deliveries admitted to neonatal intensive care (NICU), the indication was fetal distress, and reason for NICU admission in 2 babies was severe birth asphyxia and one had moderate birth asphyxia. The mother of 3 babies admitted to NICU after caesarean section had an average of 25.6 hours of latent phase of labour.

A greater number of the babies, 258/339 (76.1%), had Apgar score of 8 and above. However, 28 (16.4%) of babies delivered to mothers with prolonged latent phase of

labour had an apgar score of below 7, as compared to controls where only 5 (3.0%) babies had low apgar score. The mean fetal birth weight was 3.1 Kg (SD = 0.39). The minimum birth weight was 2.1 kg and maximum 4.5 kg.

Amongst the women with normal labour, the median duration from clinic admission to UTH admission was 4.5 hours (IQR = 6.0 – 3.25 = 2.8). The median duration from UTH admission to delivery was 4.3 hours (IQR = 7.48 – 2.15 = 5.3). Amongst the women with PLP, the mean duration for PLP was 27.2 hours (SD = 9.74). There were 129/171 (75.4%) women that were augmented in the PLP group and only one was augmented from control group for delayed first stage of labour.

Table 1.3 Labour characteristics and outcomes of the study participants stratified by cases and controls

Variable	Normal Labour (Controls) N=168		PLP Labour (Cases) N= 171	
	N	%	N	%
No. of vaginal exams				
0-2	88	52.4%	21	12.3%
3	57	33.9%	34	19.9%
4	20	11.9%	58	33.9%
5+	3	1.8%	58	33.9%
Mode of delivery				
SVD	163	97.0%	154	90.1%
Other	5	3.0%	17	9.9%
Delivery complicated by PPH?				
Yes	2	1.2%	10	5.8%
No	166	98.8%	161	94.2%
NICU admission				
No	168	100.0%	150	87.7%
Yes	0	0.0%	21	12.3%
Fetal A/S at 5 minutes				
0 -7	5	3.0%	28	16.4%
8 -9	163	97.0%	143	83.6%
Fetal birth weight				
Mean, SD	3.1; 0.39		3.1; 0.39	
Duration from UTH admission to delivery¹				
(n, median, IQR)	168; 4.3; 5.3			
Duration of PLP²				
(n, mean, SD)	171; 27.2; 9.74			

8.4 Bivariate analysis for association with labour status

Table 1.4 shows the bivariate analysis results. At 5% significance level, the following variables were significantly associated with labour status; parity, gravidity, number of vaginal examinations, mode of delivery, NICU admission, fetal Apgar Score (FAS) at 5 minutes, and whether or not delivery was complicated by PPH. Marital status, education, employment status, HIV, age, and fetal birth weight were not associated with labour category at 5 % significance level. Study variables with P-value < 0.20 were selected for logistic regression analysis.

Table 1.4 Bivariate analysis for association with labour status

Variable	Normal Labour (Controls) N=168		PLP Labour (Cases) N= 171		P-value
	n	%	n	%	
Marital status					
Unmarried	42	25.0	46	26.9	0.69 ^c
Married	126	75.0	125	73.1	
Education					
Up to Primary	75	44.6	71	41.5	0.56 ^c
Secondary or better	93	55.4	100	58.5	
Employment					
Unemployed	141	83.9	145	84.8	0.83 ^c
Employed	27	16.1	26	15.2	
Gravidity					
1	68	40.5	88	51.5	* < 0.01 ^c
2	35	20.8	41	24.0	
3	24	14.3	27	15.8	
4+	41	24.4	15	8.8	
Parity					
0	64	38.1	85	49.7	* < 0.01 ^c
1	36	21.4	43	25.1	
2	25	14.9	28	16.4	
3+	43	25.6	15	8.8	
Referral					
Self	13	7.7	8	4.7	0.24 ^c
Clinic	155	92.3	163	95.3	
HIV status					
Negative	137	82.0	125	76.2	0.19 ^c
Positive	30	18.0	39	23.8	
No. of antenatal visits					

Variable	Normal Labour (Controls) N=168		PLP Labour (Cases) N= 171		P-value
0-2	36	21.4	28	16.4	0.17 ^c
3	51	30.4	57	33.3	
4	47	28.0	62	36.3	
5+	34	20.2	24	14.0	
No. of vaginal exams					
0-2	88	52.4	21	12.3	*< 0.01 ^c
3	57	33.9	34	19.9	
4	20	11.9	58	33.9	
5+	3	1.8	58	33.9	
No. of stillbirths in previous pregnancy					
0	161	95.8	162	94.7	0.63 ^c
1+	7	4.2	9	5.3	
Mode of delivery					
SVD	163	97.0	154	90.1s	*<0.01 ^c
Vacuum	3	1.8	2	1.2	
C/S	2	1.2	15	8.8	
Delivery complicated by PPH?					
Yes	2	1.2	10	5.8	*0.02 ^c
No	166	98.8	161	94.2	
NICU admission					
No	168	100.0	150	87.7	*< 0.01 ^c
Yes	0	0.0	21	12.3	
Fetal Apgar Score at 5 minutes					
0 -7	5	3.0	28	16.4	*< 0.01 ^c
8 -9	163	97.0	143	83.6	
Age					
Mean, SD	25.3; 6.89		24.1; 5.77		0.08 ^t
Gestation age					
Mean, SD	39.4; 1.20		39.4; 1.38		0.97 ^t
Fetal birth weight					
Mean, SD	3.1; 0.39		3.1; 0.39		0.94 ^t

^c=Chi Squared Test, ^t=Independent Samples T-test, *significant at p <0.05

8.5 Logistic regression analysis: association with prolonged latent phase

From bivariate analysis results and correlation coefficient analysis, the following variables were entered into a logistic regression model; parity, HIV status, number of antenatal visits, number of vaginal examinations, mode of delivery, NICU admission, Fetal Apgar Score at 5 minutes, and age. Applying the backward selection, the maternal and fetal variables of age, parity, number of vaginal examinations, and NICU admission were found to be independently associated with labour status (Table 1.5).

Table 1.5. Logistic regression analysis: association with prolonged latent phase

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95%CI)	P-value
Age	1.0 (0.99 - 1.01)	1.10 (1.05 - 1.15)	<0.01
Parity			
3+	1	1	
0	1.33 (0.96 - 1.84)	12.29 (4.62 - 32.67)	<0.01
1	1.19 (0.77 - 1.86)	10.48 (3.88 - 28.35)	<0.01
2	1.12 (0.65 - 1.92)	8.53 (3.01 - 24.16)	<0.01
No. of vaginal exams			
5+	1	1	
0-2	0.24 (0.14 - 0.38)	0.03 (0.01 - 0.06)	<0.01
3	0.60 (0.39 - 0.91)	0.07 (0.02 - 0.18)	<0.01
4	2.9 (1.75 - 4.82)	0.33 (0.11 - 0.94)	0.04
NICU			
Yes	1	1	
No	0.89 (0.72 - 1.11)	0.11 (0.02 - 0.49)	<0.01

Younger age was associated with PLP. Considering two mothers with one a year older than the other and controlling for parity, number of vaginal exams and fetal NICU admission, the younger mother had 10% increased odds for PLP [aOdds Ratio (aOR) 1.10, 95% Confidence Interval (CI) 1.05 – 1.15, P-value < 0.01].

Low parity was associated with PLP. Controlling for age, number of vaginal exams, and NICU admission, a primiparous had on average 12 times increased odds for PLP (aOR 12.29, CI 4.62 – 32.67, P-value < 0.01) compared to women with parity greater than 2. Women with parity 1 had on average 10 times increased odds for PLP (aOR 10.48, 95% CI 3.88 – 28.35, P-value < 0.01). Women with parity 2 had on average 8 times increased odd for PLP (aOR 8.53, 95% CI 3.01 – 24.16, P-value < 0.01).

Controlling for other factors and compared to women with more than 4 vaginal examinations, women who had 0 to 2 vaginal exams had 97% reduced odds for PLP (OR 0.03, 95% CI 0.01 – 0.06, P-value < 0.01). Women with 3 vaginal exams had 93% reduced odds for PLP (OR 0.07, 95% CI 0.02 – 0.18, P-value < 0.01). Women with 4 vaginal exams had 67% reduced odds for PLP (OR 0.33, 95% CI 0.11 – 0.94, P-value = 0.04).

Controlling for other factors and compared to neonates admitted to NICU, neonates who had not been admitted to NICU had 89% reduced odds for PLP (OR 0.11, 95% CI 0.02 – 0.49, P-value < 0.01).

9. DISCUSSION

Predictors of prolonged latent phase were found to be younger maternal age, lower parity, more than four vaginal examinations, big babies and previous history of PLP.

Younger mothers had 10% increased odds of PLP [aOR – 1.10, 95% CI, 1.05 – 1.15, $p < 0.01$]. However, studies by Chelmow et al and Aziken et al did not show any significant difference with regards to age for prediction of PLP.^{2, 9} In this study the PLP was found to be higher in primigravidas 88 (51.5%) than in multigravida, (more than gravida 3), 15 (8.8%) which is similar to studies by Chelmow et al, Aziken et al and Cardozo and Studd who reported higher incidence of PLP in nulliparous.^{2, 9, 18} Similarly, Friedman found incidence of 2.3 and 0.44% amongst nulliparous and multiparous mothers respectively.⁵ The difference in the magnitude of prolonged latent phase of labour between nulliparous and multiparous patients can be attributed to the definition used for prolonged labour.

In this study, prolonged latent phase of labour was defined as more than 8 hours from onset of contractions up to 3 cm of cervical dilation for both nulliparous and multiparous women. On the other hand, other studies considered 20 and 14 hours for nulliparous and multiparous patients as the prolonged duration of latent phase of labour.^{2, 3, 5, 9} Inefficient uterine contractions are more common in nulliparous than multiparous women,^{2, 5} and this study shows that prolonged latent phase of labour is more common in nulliparous than in multiparous women.

This study looked at number of vaginal examination and its association with PLP and found that the more vaginal examination done the more chance of having PLP. It simply reflects that vaginal examinations are done to assess the progress of labour and for women who have prolonged labour will have more vaginal examinations done. No similar reports have been identified on studies on PLP. Women with 4 vaginal examinations had 67% reduced odds for PLP, as compared to women who had 0-2 vaginal examinations with 97% reduced odds of PLP.

It appears that PLP is a pointer towards big babies. Mothers who were referred for CPD or big babies from the clinic indeed had prolonged latent phase in this study. This is similar to Aziken et al, where babies were significantly bigger than control group.

From this study, women with prior history of PLP were shown to have repeat PLP.

From this current study there were only 2 patients in the case group who had previous PLP and both underwent augmentation but none from the control group with a previous history of PLP. This finding has also been shown in study by Aziken et al.⁹ However in Aziken et al's study it also showed that parturients with previous history of PLP were significantly younger in age and parity than those without such a history.⁹

The outcomes associated with PLP were increase in: intervention, operative deliveries, poor Apgar score and NICU admission.

Amongst the cases 129 (75.4 %) had oxytocin augmentation (24.6% of the cases were not augmented), 154 (90.1%) delivered SVD, 15 (8.8%) had caesarean section, 2 (1.2%) had vacuum delivery and 21 (12.3 %) of the neonates were admitted to NICU. These figures were higher than the control group, and it shows that PLP is associated with increase in interventions and neonatal morbidity.

The frequency of augmentation was greater in the cases 129 (75.4%) than the controls (only one was augmented for delay in first stage of labour) and reflects contractile abnormality as a possible cause of prolonged latent phase. Cardozo and Studd have described prolonged latent phase as an aberrant labour pattern for which O'Driscoll and Meagher advocate intravenous oxytocin.^{18,19} This finding is similar to reports by Maghoma and Buchmann.¹⁰ The overall duration of labour was significantly longer amongst the cases than controls, and this can be attributed to poor contractility of uterus and there were more nulliparous in case arms 88 (51.5%) than in controls 68 (40.5%) and, as mentioned earlier, poor uterine contraction is more common in nulliparous than in multiparous women.

This study confirmed higher rates of caesarean section of 15 (8.8%) in cases and the commonest indication for cesarean section was CPD 8 (53%), followed by foetal distress 5 (33%) and failed augmentation 3 (20%). It appears that prolonged latent phase of labour is a pointer towards big babies. These findings are similar to Friedman (1961) and Maghoma and Buchhmann (2002) where they reported higher rates of caesarean section amongst parturients with prolonged latent phase.^{5,10} Of note is that this mothers who had caesarean deliveries for CPD were referred from clinic for big babies.

With regards to immediate perinatal outcome determined by Apgar score there was no significant difference in the score between neonates in cases and control. However,

there was a higher proportion of birth asphyxia in cases than in controls; at Apgar score 5 minutes 17 (9.9%) vs 2 (1.2%) respectively. Similar findings have been reported by Aziken et al⁹ and Chelmow et al.² The increase in birth asphyxia in cases can be attributed to increases in uterine pressures associated with prolonged labour and the duration of labour which is longer in cases than in controls.

This study also showed an increase in NICU admission of 21 (12.3%) in cases and none from controls; this was similar to Aziken et al's study (9.5% vs 1.7%). The main reasons being birth asphyxia 20 (95.2%) and neonatal sepsis 1 (4.8%). This could be due to dysfunctional labour associated with prolonged latent phase and the duration of overall labour.

10. CONCLUSION

This study has shown that prolonged latent phase of labour is a predictor of labour dystocia and neonatal morbidity. It is manifested by higher intervention rates such as augmentation and operative deliveries amongst cases than controls. Babies delivered following prolonged latent phase of labour require more neonatal attention than controls. Therefore, all women with prolonged latent phase should be referred to UTH to reduce on morbidity and mortality.

11. STUDY LIMITATIONS

It was difficult to exactly quantify and/or assess the duration of latent phase of labour as cervical assessment is subjective and many parous women may have been diagnosed in labour when in actual fact there may not be in labour, as these women have parous os.

12. RECOMMENDATIONS

1. The role of early interventions may help in improving fetal outcome in patients with prolonged latent phase of labour.
2. Women identified as PLP should be referred beforehand to UTH for timely interventions.
3. Larger studies of prolonged latent phase of labour in Zambia are needed to better quantify the fetal risks associated.

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14. APPENDICES

APPENDIX I: QUESTIONNAIRE

UTH ID/ serial no: _____

Demographic Data

1. Age: _____
2. Educational level: 0) None 1) Primary 2) Secondary 3) Tertiary
3. Employment status: 0) Unemployed 1) Employed
4. Marital status: 0) Single 1) Married 2) Divorced 3) Widowed

Maternal variables

Antenatal

5. Gravidity: _____
6. Parity: _____
7. Gestational age: _____
8. Name of referring clinic: _____
9. Reason for referral: _____
10. What is the HIV status of the client? 0) Negative 1) Positive 2) Unknown
11. Number of antenatal visits: _____
12. Number of previous caesarean delivery _____
13. Number of vaginal examinations: _____
14. Number of stillbirths in previous pregnancy _____
15. Number of neonatal deaths in previous pregnancy _____
16. Prolonged latent phase in previous pregnancy? 0) Yes 1) No

Intra partum and postpartum variables

17. Date of admission at clinic if referred from clinic: _____
18. Time of admission at clinic: _____
19. Date of admission to UTH: _____

20. Time of admission to UTH: _____
21. Date of augmentation: _____
22. Time of augmentation: _____
23. Date of delivery: _____
24. Time of delivery: _____
25. Date of discharge: _____
26. Mode of delivery: 0) SVD 1) Vacuum 2) Forceps 3) C/S
27. Indication for operative delivery: _____
28. Delivery complicated by PPH? 0) Yes 1) No
29. Number of unit's blood transfused: _____

Fetal variables

30. Fetal A/S at 5 minutes: _____
31. Birth weight: _____
32. Admission to NICU: _____
33. Reason for admission to NICU: _____
34. Duration of admission to NICU: _____

APPENDIX II: ETHICS APPROVAL



THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
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Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

Assurance No. FWA00000338
IRB00001131 of IORG0000774

9th April, 2015.

Our Ref: 009-02-15.

Dr. Nusraat Gangat,
University Teaching Hospital,
Department of Obstetrics and Gynaecology,
P/Bag RW IX,
Lusaka.

Dear Dr. Gangat,

RE: RESUBMITTED RESEARCH PROPOSAL: "FETAL OUTCOMES IN ANTENATAL WOMEN ADMITTED WITH A DIAGNOSIS OF PROLONGED LATENT PHASE OF LABOUR AT UNIVERSITY TEACHING HOSPITAL" (REF. No. 009-02-15)

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 2nd April, 2015. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,

M.M. Mbewe (Mrs)
CHAIRPERSON

Date of approval: 9th April, 2015.

Date of expiry: 8th April, 2016.

Appendix III: INFORMATION SHEET AND CONSENT FORMS

This is a study being carried out on pregnant women at the University Teaching Hospital (UTH) to see prolonged latent phase of labour leads to poor fetal outcomes. I am Dr. Nusraat Gangat, a Masters Student at the University Teaching Hospital.

Purpose:

Prolonged latent phase of labour is associated with poor fetal outcomes based on studies done elsewhere, outcomes are yet to be known at UTH. The purpose is to find out what complications are associated with prolonged latent phase of labor of women delivering at UTH.

What happens in this research study?

You will be asked some questions and certain information will be obtained from your antenatal card and UTH file. If you agree to par take, then you will be given a consent form to sign and proceed with a questionnaire.

Possible risks

You will not be exposed to any risks by taking part in this study, except for the anxiety that may be induced from being aware of outcomes associated with prolonged latent phase of labour.

Benefits

Depending on what is found in this study, the information may help in the care provided to pregnant women in the future.

Confidentiality

All the information collected from you will be kept strictly confidential and will only be used for this study. Your name will never be made public; a study-specific number will be used to identify the information obtained from you.

Consent

Your participation in this study is purely voluntary and should you feel withdrawing from the study, you are free to do and if you decide not to take part in this study, the regular medical care provided to you at UTH will in no way be affected by your decision.

CONSENT FORM

Study to determine fetal outcomes in antenatal mothers admitted with as diagnosis of prolonged latent phase of labour at University Teaching Hospital, Lusaka.

I _____
(participant's name, signature or thumb-print) have had the study explained to. I understand the benefits of the study and risks involved. Questions/queries I had have been answered. I 'volunteer/do not volunteer to participate in the study.

Participant's signature/thumb print _____ Date _____

Person obtaining informed consent _____

Signature of person obtaining consent _____ Date _____

Contact details

Should you require any more information on the study or on your rights as a participant, you may contact the following:

Dr. Gangat Nusraat Principle Investigator, University Teaching Hospital, Department of Obs. & Gyn., Mobile #: 260-977-855 627 E-mail:naailagangat@me.com		The Chairperson UNZA Biomedical Research Ethics Committee Ridgeway Campus, P.O.Box 50110 LUSAKA Tel: 0211-256067
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Appendix IV: UTH PERMISSION

P.o.box 37809,
Lusaka,
Zambia.
2nd February 2015

The senior medical superintendent
University Teaching Hospital,
Lusaka



Approved

A handwritten signature that reads "Approved" is written over a circular official stamp. Below the signature are handwritten initials, possibly "G".

Dear Sir,

RE: PERMISSION TO CONDUCT A RESEARCH ENTITLED: FETAL OUTCOMES IN ANTENATAL WOMEN ADMITTED WITH A DIAGNOSIS OF PROLONGED LATENT PHASE OF LABOUR AT UNIVERSITY TEACHING HOSPITAL.

I am hereby seeking permission to conduct the above captioned study in the department of obstetrics and gynecology of UTH. This is part of the requirement for the award of the masters of medicine degree in obstetrics and gynecology.

Kindly receive my research proposal for your consideration.

Your favorable response to this matter will be highly appreciated.

Yours faithfully

T. Gangat

Gangat nusraat