SUCCESS RATE OF TRIAL OF LABOR AFTER PREVIOUS CESAREAN SECTION (TOLAC), MATERNAL AND FETAL OUTCOMES, AND DETERMINANT FACTORS AT JIMMA UNIVERSITY MEDICAL CENTER: PROSPECTIVE LONGITUDINAL STUDY

By: Ukasha Aynage (MD)

A RESEARCH PAPER TO BE SUBMITTED TO DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, MEDICAL FACULTY, INSTITUTE OF HEALTH, JIMMA UNIVERSITY; FOR THE PREPARATION OF A SENIOR PAPER AS A PARTIAL FULFILLMENT FOR THE REQUIRMENT OF SPECIALITY CERTIFICATE IN OBSTETRICS AND GYNAECOLOGY

AUGUST 2018

JIMMA, ETHIOPIA

SUCCESS RATE OF TRIAL OF LABOR AFTER PREVIOUS CESAREAN SECTION (TOLAC), MATERNAL AND FETAL OUTCOMES, AND DETERMINANT FACTORS AT JIMMA UNIVERSITY MEDICAL CENTER: PROSPECTIVE LONGITUDINAL STUDY

By: *Ukasha Aynage (MD)*

Advisors*: 1. Fitsum Araya (MD, Consultant, Associate prof. OB/GYN)*

2. Habtemu Jarso(BSc, MPH/Epid)

AUGUST 2018

JIMMA, ETHIOPIA

Abstract

Background: Vaginal delivery after previous one cesarean section for a non-recurring indication has been described by several authors as safe. Encouraging vaginal birth after CS has been considered a key method of reducing the cesarean rate. Although attempts at a Trial of Labor after a Cesarean Birth (TOLAC) have become accepted practice and having a success rate of 60–80%, the rate of successful TOLAC has decreased during the past decades. Concerns about immediate maternal and neonatal complications associated with uterine rupture have contributed to a decrease in vaginal birth after CS rates. Therefore assessing rate of success and factors associated with successful VBAC is very important to for counseling mothers while offering TOLAC as an option.

Objective: To determine the success rate of TOLAC, maternal and fetal outcomes, and determinant factors of success of trial of labor after previous cesarean delivery (TOLAC) at Jimma University Medical Center, December 1st, 2017-July 31st, 2018**.** Jimma, Ethiopia.

Methods: The study was a prospective longitudinal study of women with one previous scar who were admitted to maternity and labor ward, JUMC, from 1st of December, 2017 to 31st of July, 2018. Trained midwives and principal investigator collected the data through face-to-face interview and record review by using pre-tested structured questionnaire and checklist respectively. Epidata Version 3.1 was used to enter data and SPSS version 24.0 was used for analysis. Logistic regression analysis was conducted to identify factors associated with success of TOLAC.

Result: The success rate of TOLAC was 133 (63.6%) where most (112, [84.2%]) delivered by vaginal route, of which 16 (12.0%) by forceps vaginal delivery and 5 (3.8%) by vacuum vaginal delivery (VVD). For those who delivered by C/S, the leading indications were prolonged latent phase of labor (28, [36.8%]), arrest of labor (20, [26.3%]), NRFHR (14, [18.4%]) and CPD (11, [14.5%]). Indication for previous C/S CPD or malpresentation compared to NRFHR, (AOR: 0.358, 95% CI: 0.141,0.907) & (AOR: 0.335, 95% CI: 0.120, 0.938) respectively, interval from previous pregnancy (less than 2 years compared to 2 years and above (AOR: 0.450, 95% CI: 0.222, 0.910), phase of labor (active compared to latent (AOR: 2.415, 95% CI: 1.236, 4.719) and second stage compared to latent (AOR: 4.551, 95% CI: 1.030, 22.949) and parity (Para one compared to para two and above mother (AOR: 0.395, 95% CI: 0.200, 0.782) were factors significantly associated with success of TOLAC. Neonatal intensive care admission was significantly higher in the successful TOLAC group (6/8). Perinatal mortality rate (PNMR) was 14.4/1000. The leading intrapartum complication was NRFHRP (17/19). There was one case of uterine rupture, making the rate of 0.5%, and there was a case of iatrogenic bladder injury among failed TOLAC participants.

Conclusion: We found out in our study that appropriate candidates has desired outcome in TOLAC, TOLAC is a very good option.

ACKNOWLEDGEMENTS

My heartfelt gratitude goes to my advisors Dr. Fitsum Araya (MD, Consultant, assoc. Prof. OB/GYN) and Habtemu Jarso (BSc, MPH/Epid) for their assistance, constructive comments and suggestion throughout the development of this research paper to its final form, including topic selection and research proposal development for every single minutes of their precious time and energy they invested to make this paper into its final form.

I am so grateful to all those who participated in collecting data.

Finally I would like to extend my greatest gratitude to our clients/parturients that have helped us in responding to the questionnaires despite discomforts of the labor pain, without their cooperation, this paper would not have come to its final form.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

ACOG- American College of Obstetricians and Gynecologists.

C/S- Cesarean Section.

CPD- Cephalopelvic Disproportion

EMCD- Emergency Cesarean delivery.

ERCD- Elective Repeat Cesarean Delivery.

HDP- Hypertensive disorders of pregnancy

JUMC- Jimma University Medical Center.

NIH- National Institute of Health.

NRFHRP- Non reassuring Fetal Heart Rate Pattern.

PIH – Pregnancy induced hypertension

PROM- Premature Rupture of Membrane

RCOG- Royal College of Obstetrics and Gynaecology

SPSS- Statistical Package of Social Sciences

TOLAC- Trial of Labor after Cesarean delivery.

VBAC- Vaginal Birth after Cesarean.

WHO- World Health Organization

CHAPTER-ONE INTRODUCTION

1.1 Background

The dictum “Once a cesarean, always a cesarean” has largely permeated the obstetric practice for most of the twentieth century and today [1].

Although trial of labor after previous cesarean delivery (TOLAC) provides women who had a prior cesarean with an opportunity to achieve a vaginal birth after cesarean (VBAC), this was not considered a reasonable option until the 1970s to 1980s [2,3,4].

As the annual incidence of cesarean delivery increased from less than 5 per 100 live births during the 1970s to 23.5 per 100 live births in the United States in 1988, the National Institute of Health (NIH) and the World Health Organization (WHO) held consensus conferences in the 1980s and concluded that cesarean delivery rates were too high and that VBAC was an acceptable approach for reducing cesarean delivery. With this change in recommendations, the annual incidence of VBAC (defined as the number of VBACs per 100 women with a prior cesarean delivery per year) increased from 5/100 (5%) in 1985 to 28.3/100 (28.3%) in 1996 [5,6,7,8].

The national/Ethiopian cesarean section rate increased from 0.7% in 2000 to 1.9% in 2016, with increases across seven of the eleven administrative regions of Ethiopia. Addis Ababa had the highest cesarean section rate (21.4%) in 2016 and the greatest increase since 2000. In the adjusted analysis, women who gave birth in private health facility had a 78.0% higher risk of cesarean section (adjusted prevalence ratio (aPR) (95% CI) 1.78 (1.22, 2.58)) compared with women who gave birth in public health facility. Having four or more births was associated with a lower risk of cesarean section compared with first births (aPR (95% CI) 0.36 (0.16, 0.79)) [9].

Offering trial of labor after cesarean (TOLAC) can reduce individual morbidity and population-level cesarean delivery rates. Our objective was to assess trends in TOLAC and incidence of uterine rupture in a contemporary cohort [10,11].

With increasing number of TOLAC, there were also reports of uterine scar dehiscence or rupture and associated maternal and/or neonatal morbidity and mortality. In the next decade, there was a steep decline in the frequency of VBAC down to an incidence of 8.5/100 (8.5%) in 2006, likely caused by concern for perinatal morbidity and associated medical-legal liability [12-15].

Uterine rupture is the most important cause of maternal death during TOLAC, and, as discussed above, is associated with a maternal death rate of approximately 1 per 500 uterine ruptures [16].

In an study carried out by Jourdan E. Triebwasser et al at University of Michigan they found 20 cases of uterine rupture during the study period out of total of 2147 (range 1968-2326) participants. In their study, the VBAC rate ranged from 21-36%. All cases of uterine rupture were occurred in women with at least one prior cesarean delivery; six women had two cesarean scars (Fourteen women had one c/s scar). There was no significant increase in uterine rupture rate; however, the rate during the last 3 time periods was greater than 3% (median 1.4%, range 0-4.1%) [17].

The recent Practice Bulletin by the American College of Obstetricians and Gynecologists (ACOG) on Vaginal Birth after Previous Cesarean Delivery recommended that most women with one previous cesarean delivery with a low transverse incision are candidates for and should be counseled about VBAC and offered TOLAC [10].

In 1998 and 1999, the American College of Obstetricians and Gynecologists issued updated Practice Bulletins supporting VBAC, but also urging a more cautious approach. Subsequently, fewer women attempted VBAC, and there was a corresponding increase in the overall cesarean delivery rate. In 2007, VBAC rates in the U.S. decreased to a rate of 8.5 percent (Hamilton and associates, 2009).

1.2 Statement of the problem

There has been a persistent concern in obstetrics about the increasing rate of primary cesarean section. This is not restricted by geographical location. Rates higher than those recommended by the World Health Organization (WHO) have been reported in most parts of the world including developing nations [19].

The increased rate of caesarean section inevitably translates to a higher proportion of women with scarred uteri. This poses a challenge to the management of subsequent pregnancies as they become more risky than non-scarred uteri and are prone to complications especially where vaginal birth after caesarean section (VBAC) is practiced. There have been concerns about the safety and appropriateness of VBAC with reports of poor perinatal outcomes associated with the TOLAC. Reports emanating from well-designed studies have led to doubt on the safety of the practice of VBAC with subsequent diminishing acceptance rates [20].

The concerns about perinatal outcomes coupled with litigation pressures have also led to the introduction of stringent measures in most developed countries based on the available evidence [21].

There is a growing concern over the rising rate of Cesarean section in developing countries; Cesarean section rates have been significantly linked to the practice of VBAC [22,23].

The practice of VBAC has however persisted in most countries in sub-Saharan Africa despite lack of clear evidence based guidelines like the ones used in the industrialized nations. Absence of such guidelines could compromise both maternal and fetal safety. The use of institutional protocol-based care could reduce the incidence of such adverse events in mothers with previous cesarean section if the recommended interventions are implemented [24, 25].

As for developing countries, like our own one, we don’t have extensive studies for recommending or not, so the aim of this study was to describe the success rate of TOLAC/VBAC, maternal and fetal outcomes and determinant factors in women with one prior Cesarean section seen at JUMC, Jimma, Ethiopia.

CHAPTER –TWO LITERATURE REVIEW

2.1 Literature Review

Caesarean section is a common surgical procedure performed on women worldwide. The rate of caesarean section in most developed countries around the world has continued to increase over recent years, and currently accounts for 21.3% of all births in the United Kingdom, 23% in Northern Ireland, 23.3% in Australia, and 26% in the United States [26,27,28].

Caesarean section rates in South America are reported to be even higher, reaching in excess of 50% in some private hospitals in Chile, Argentina, Brazil and Paraguay. Many reasons have been suggested to account for the increase in caesarean section observed over recent years, including the increasing use of electronic fetal heart rate monitoring during labor, a reduction in the training available to obstetricians in both operative vaginal births and vaginal breech births, in addition to fears of litigation [19,30].

Repeat caesarean section is the most common primary indication for a woman undergoing a repeat caesarean, accounting for 28% of births in the United Kingdom and over 40% of cesarean births in the United States. In South Australia, the main reason (56.6%) for women having an elective caesarean is that they have had a previous caesarean section, and 13.9% of emergency caesareans performed are in women who have had a previous caesarean. Figures from the United States in 2003 indicate a repeat caesarean section rate of 89.4%, with a similar proportion of caesareans (88.7%) occurring in women considered to be 'low-risk'[26,31-33].

The overall TOLAC among US studies was 58%, with a range of 28% to 70%. For studies initiated after 1996, less than half of women (44%) had a TOLAC, compared with 62% of women in studies initiated before 1996. Many factors, including site of delivery (rural vs urban), type of hospital (teaching vs community), history of prior vaginal delivery (including prior VBAC), and race/ethnicity (black and other minorities vs white), had been identified to modify TOLAC rates. The incidence of VBAC among people who had TOLAC is approximately 74% in the United States [34,35].

A study was conducted in Department of Obstetrics and Gynecology, Section of Maternal-Fetal Medicine, University of Chicago, Pritzker School of Medicine, Illinois, USA to determine the

maternal risks associated with failed attempt at vaginal birth after cesarean compared with elective repeat cesarean delivery or successful vaginal birth after cesarean from 1989 to 1998. Data were extracted from a computerized obstetric database and from medical charts. A total of 29,255 patients were delivered during the study period, with 2450 having previously had cesarean delivery. Repeat cesarean deliveries were performed in 1461 women (5.0%), and 989 successful vaginal births after cesarean delivery occurred (3.4%). Charts were reviewed for 97.6% of all women who underwent repeat cesarean delivery and for 93% of all women who had vaginal birth after cesarean. Vaginal birth after cesarean was attempted by 1344 patients or 75% of all appropriate candidates. Vaginal birth after cesarean was successful in 921 women (69%) and unsuccessful in 424 women. Four hundred fifty-one patients undergoing cesarean delivery were deemed appropriate for vaginal birth after cesarean. Multiple gestations were excluded from analysis. Final groups included 431 repeat cesarean deliveries and 1324 attempted vaginal births after cesarean; in the latter group 908 were successful and 416 failed. The overall rate of uterine disruption was 1.1% of all women attempting labor; the rate of true rupture was 0.8%; and the rate of hysterectomy was 0.5%. Blood loss was lower (odds ratio, 0.5%; 95% CI, 0.3-0.9) and chorioamnionitis was higher (odds ratio, 3.8%; 95% CI, 2.3-6.4) in women who attempted vaginal births after cesarean. Compared with women who had successful vaginal births after cesarean, women who experienced failed vaginal births after cesarean had a rate of uterine rupture that was 8.9% (95% CI, 1.9-42) higher, a rate of transfusion that was 3.9% (95% CI, 1.1-13.3) higher, a rate of chorioamnionitis that was 1.5% (95% CI, 1.1-2.1) higher, and a rate of endometritis that was 6.4% (95% CI, 4.1-9.8) higher[36].

When the cesarean was performed for nonrecurring indications, such as fetal mal-presentation or breech, the probability of VBAC was approximately 75%. One retrospective study in US reported that a previous cesarean delivery performed for malpresentation significantly increased the likelihood of VBAC (OR 7.4; 95% CI 2.8–19.2). Another retrospective study also reported a similar association of VBAC for breech as the indication compared with nonbreech indications, although the estimated OR was smaller (OR 1.9; 95% CI 1.0–3.7). Although previous cesarean for nonrecurring indications as discussed earlier is a favorable predictor of VBAC, it seems that the probability of achieving VBAC is lower if prior indication of cesarean was related to cephalopelvic disproportion. More specifically, when failure to progress/active phase arrest, labor dystocia, arrest of descent, or cephalopelvic disproportion were the indications of previous

cesarean, the likelihood of VBAC is about 54% (48%–60%). The likelihood of VBAC is around 60% (49%–69%) if fetal intolerance of labor/fetal distress was the reason for prior cesarean. Thus, compared with previous cesarean performed for nonrecurring indications (such as malpresentation/breech), women whose previous cesarean was performed for recurring indications had lower odds of achieving VBAC (adjusted OR [OR] 0.42–0.8; 95% CI 0.3–0.6)[34].

The likelihood of VBAC may be modified by intrapartum conditions such as cervical status and labor progression. Some studies have reported that women admitted with a more favorable cervical status (e.g. cervical dilation >4 cm, advanced effacement) in spontaneous labor have a twofold increase in the likelihood of VBAC compared with those with unfavorable cervix (OR 2.2–2.6; 95% CI 1.7–2.8). When As a continuous variable, each centimeter in cervical dilatation at admission is associated with increased odds of VBAC (OR 1.89; 95% CI 1.13–3.22). More than 75% effacement of the cervix (compared with 25% effacement) at admission also increases the likelihood of VBAC (OR 2.72; 95% CI 2.00–3.71) [37].

From the study Cross sectional done in India to determine the success rate and safety of vaginal delivery after previous one caesarean section (VBAC), 100 numbers of cases were eligible to undergo trial of labor. Of these 20 patients opted out from the study, 61 patients delivered vaginally and remaining 19 cases had failed trial of labor and had to undergo repeat caesarean section (CS). Out of total 19(23.8%) cases that underwent caesarean section, maximum study cases presented with scar tenderness 10(52.7%). followed by fetal distress in 6(31.6%) cases. VBAC success rate their institution during the study period was 76.2% [38].

From a prospective observational study was conducted at department of Obstetrics and Gynecology, LLRM Medical College Meerut, India during one year period from Nov 2015-May 2016. Participants to study the maternal and fetal outcome in pregnant women with previous one LSCS. 200 pregnant women were included in the study and outcomes were studied. Out of 200 cases 122 patients underwent vaginal birth after Cesarean (VBAC) accounting for 61% and 78 patients underwent 2nd LSCS (76 emergency LSCS and 2 elective LSCS). Out of 76, 55 patients were given trial of VBAC but failed and end up in C-Section showing success rate of 68.92% for VBAC (122 out of 177). Adhesions were found in 21patients out of 78 (26.92%) who underwent LSCS. Uterine rupture seen in 2 patients out of 200 cases (1.0%). Scar dehiscence was seen in 6

out of 78 patients (7.69%). Post-partum Hemorrhage was seen in only 20 (10%) patients. Pre-term Pregnancy occurred in 16 (8%) patients. Caesarean Hysterectomy had to be done in 3 (1.5%) patients. Placenta Previa was seen in 6 out of the 200 patients (3%) and placenta accrete was seen in 1 patient (0.5%). Out of 200 patients, 2 twins were born. The total number of babies born was 201. 8 IUDs occurred out of 201 babies (3.98%) and a total of 25 out of 193 live babies (12.95%) required admission to Neonatal Intensive Care Unit out of which 2 babies died [39].

Another prospective observational study was carried out in a tertiary care teaching hospital over a period of two years in the same country, India, to assess the safety and success rate of vaginal birth after CS (VBAC) in selected cases of one previous lower segment CS (LSCS). The prospective observational study was carried out in a tertiary care teaching hospital over a period of two years. One hundred pregnant women with a history of one previous LSCS were enrolled in the study. In the present study, 85% cases had a successful VBAC and 15% underwent a repeat emergency LSCS for failed trial of vaginal delivery. Cervical dilatation of more than 3 cm at the time of admission was a significant factor in favor of a successful VBAC. Birth weight of more than 3,000 g was associated with a lower success rate of VBAC. The incidence of scar dehiscence was 2% in the present study. There was no maternal or neonatal mortality [40].

Balachandran L and his colleagues carried out retrospective analysis of medical records of 151 women with previous one cesarean section who delivered at the Mafraq Hospital, Abu Dhabi between January-August 2011. Continuous and categorical data were presented in the form of mean, standard deviation and percentage, while proportions were analyzed using the chi-square test. A p-value ≤ 0.05 was considered statistically significant. Of the 151 women, 115 were candidates for TOS. Of them, 96 (83.47%) had vaginal birth after cesarean (VBAC) and 19 (16.5%) had a repeat cesarean section. There were four cases of primary postpartum hemorrhage (PPH) and two cases of scar dehiscence in the study group. No significant perinatal morbidity was observed. VBAC rate was significantly more in women who had prior vaginal deliveries, especially in those with previous VBAC [41].

Prospective descriptive study done in Maharaj Nakorn Chiang Mai Hospital, Chiang Mai, Thailand. To assess the success rate of vaginal birth after cesarean delivery (VBAC) in pregnant women with prior cesarean scar who delivered at Maharaj Nakorn Chiang Mai Hospital. The

success rate of VBAC after trial of labor was 54.4 per cent (43 in 79). No uterine rupture or serious complication occurred in the present study [42].

A retrospective study on the outcome of 130 consecutive patients with a previous lower segment Caesarean section who delivered in Kandang Kerbau Hospital, Singapore from January to June 1989 was performed. Seventy-six percent of these patients were selected for a trial of labor and 24% of the patients had a repeat (elective) Caesarean section. Vaginal delivery was achieved in 65% of patients chosen to undergo a trial of labor. A trial of labor was found to be relatively safe with only a 0.7% incidence of uterine dehiscence and a perinatal mortality of 10.1 per 1,000 births with no maternal mortality. Cephalopelvic disproportion in the previous pregnancy and cervical dilatation during the previous Caesarean section were not important prognostic factor for the subsequent pregnancy outcome. A previous vaginal delivery in patients who had a previous Caesarean section was a good prognostic factor for a subsequent successful vaginal delivery ($p < 0.05$) in the trial of labor. More vaginal deliveries ($p < 0.05$) were achieved when oxytocic infusion was used in selected cases during the trial of labor. Maternal morbidities were higher in patients who had a failed trial of labor (57%) and repeat elective Caesarean section (20%) than those who had a successful trial of labor (10%). Management of patients with a previous lower segment Caesarean section may present a dilemma, but if properly conducted, the outcome can be favorable [43].

A three year (2000 – 2003) prospective study of all cases of trial of labor after one previous caesarean section at the Havana Specialist Hospital Lagos, Nigeria. Of the 1481 deliveries in the hospital during the period, 179(11.9%) had previously been delivered through caesarean section. While 29.3% (51) of the women with previous caesarean delivery had elective caesarean section, 70.7% (123) were allowed trial of labor. Eighty five (69.1%) women had successful trial of labor. The failure rate was thus 30.9%. Cephalopelvic disproportion and slow progress of labor was the main cause of failure. Majority (58.8%) of the patients that achieved vaginal deliver needed assistance in the form of vacuum delivery (40.0%), vacuum deliver & episiotomy (30.0%), episiotomy alone (28.0%) and forceps deliver (2.0%). When fetal and maternal outcome were compared between emergency and elective caesarean section, it was only in Apgar score at 1 minute was there significant difference. One (0.8%) uterine rupture occurred because

of delayed consent and she was not among the eight patients that had oxytocin augmentation of labor [44].

Study done in Singapore to evaluate whether there are any predictors for caesarean delivery and neonatal admission, following trial of labor after one lower transverse caesarean section found out f following multivariate logistic regression analysis, no previous vaginal birth (adjusted odds-ratio [AOR] 3.4), diabetes mellitus or hypertension in pregnancy (AOR 1.7), induction of labor (AOR 2.0), oxytocin use in labor (AOR2.4), and meconium-stained liquor (AOR 4.9) were independent predictors of emergency caesarean delivery. Diabetes mellitus or hypertension in pregnancy (AOR 3.1), pre labor rupture of membranes (AOR 4.7) and caesarean delivery (AOR 6.0) were independent predictors of neonatal admission [45].

A cross-sectional study was carried out in department of Obstetrics & Gynaecology, Women and Children Hospital, Abbottabad, Pakistan from December 2017 2012 to March 2013. The purpose of this study was to evaluate the effect of birth weight on the success of labor in women with previous one caesarean section. One hundred women were included who had previous one caesarean section and were now in their pregnancy with single fetus at term. These women were in spontaneous labor and consented to undergo trial of scar. Patients were grouped according to birth weight as Group-1 <3 Kg, Group-2 with 3.1-3.5 Kg and Group-3 with 3.6-0 Kg. Age in years, period of gestation in weeks and birth weight were recorded. The mean age of patients was 28.9 (range 25 to 40 years). The mean gestation was 38(37 to 41 weeks). Out of 100 parturient, 59 (59%) had birth weight 2.5-3 Kg while 25(25%) had 3.1-3.5 Kg and only 16(16%) had birth weight 3.6-4 Kg. The overall success rate for vaginal delivery after previous caesarean was highest for Group-1, and lowest for Group-3, suggesting a strong correlation of birth weight with success of vaginal birth after caesarean section [46].

A prospective observational study was conducted at Lady Hardinge Medical College and Smt. Sucheta Kriplani Hospital, India on 300 pregnant women with one previous caesarean section fulfilling the eligibility criteria for trial of labor, to study the predictive factors and the outcome of trial of labor. The data obtained were analyzed according to mode and outcome of labor and was then subjected to statistical analysis. The success rate of trial of labor was found to be 53.6%. Favorable Bishop's score (p=0.000), spontaneous onset of labor (p=0.005) and history of previous delivery after caesarean (p=0.007) were significantly associated with a successful

outcome of trial of labor. Higher chances of vaginal delivery were found with breech as an indication of previous caesarean section, i.e. 67.1% as compared to 39% with non-progress of labor as an indication [47].

Tan study with the objective of determining the circumstances in which trial of scar was conducted in the obstetric unit of Tikur Anbessa Hospital, Addis Ababa, Ethiopia, and evaluate the safety of the undertaking in terms of maternal and perinatal morbidity and mortality. Between 11 September, 1991 to 10 September, 1992, 66 women with previous caesarean section were given a trial of scar. Forty seven (71.2%) parturients delivered vaginally. In 19 (28.2%) an emergency repeat section was done for failure of progress in labor. In one (1.5%) patient, a uterine scar dehiscence was detected. The 5th minute APGAR score was 7/10 or more in 64 (94.1%) and 6/10 in 3 (4.5%) of 68 neonates. There was one prepartum intra-uterine fetal death and one neonatal death of a preterm baby making the perinatal mortality rate (PNMR) of 29.4 per thousand. There was no maternal death [24].

Birara M and Gebrehiwot Y. had undergone a case control study to assess factors associated with successful VBAC in three teaching Hospitals in Addis Ababa, Ethiopia. The sample size of the cases was 101vaginal deliveries and the controls were 103 failed VBAC patients which made the case to control ratio of 1:1. In this study independent factors determining successful VBAC were, history of successful VBAC in the past, rupture of membrane at admission, and cervical dilatation of more than 3cm at admission. Presence of meconium, malposition and history of stillbirth were associated with failed VBAC. Factors like maternal age, past caesarean indications, inter delivery interval, and birth weight were not found to be significant determinants of success. The most common reason for repeat cesarean section for after trial of labor was labor dysfunction because of absence of a policy for augmentation on a scarred uterus in these hospitals (49).

Uterine rupture is potentially life threatening and catastrophic for the expecting mother and her fetus (-es), and it is the outcome associated with TOLAC that most significantly increases the risk of perinatal morbidity and mortality. Among studies that examined uterine rupture for both TOLAC and ERCD groups, the overall incidence of uterine rupture was 0.30% (95% CI 0.23%–0.40%); however, 96% of ruptures occurred in women who had TOLAC. Thus, despite the absolute risk of uterine rupture remaining low, the risk of uterine rupture is higher for women

undergoing TOLAC than ERCD. In addition, the occurrence of uterine rupture was higher for studies limited to term pregnancies compared with studies that included women of any gestational age at delivery (0.78% vs. 0.32%, respectively. When the direction of previous uterine incision was examined as a risk factor for uterine rupture, one multicenter cohort study reported that women with a low, transverse cesarean delivery or an unknown scar have the lowest risk of rupture (0.63%–0.75%) [34,50].

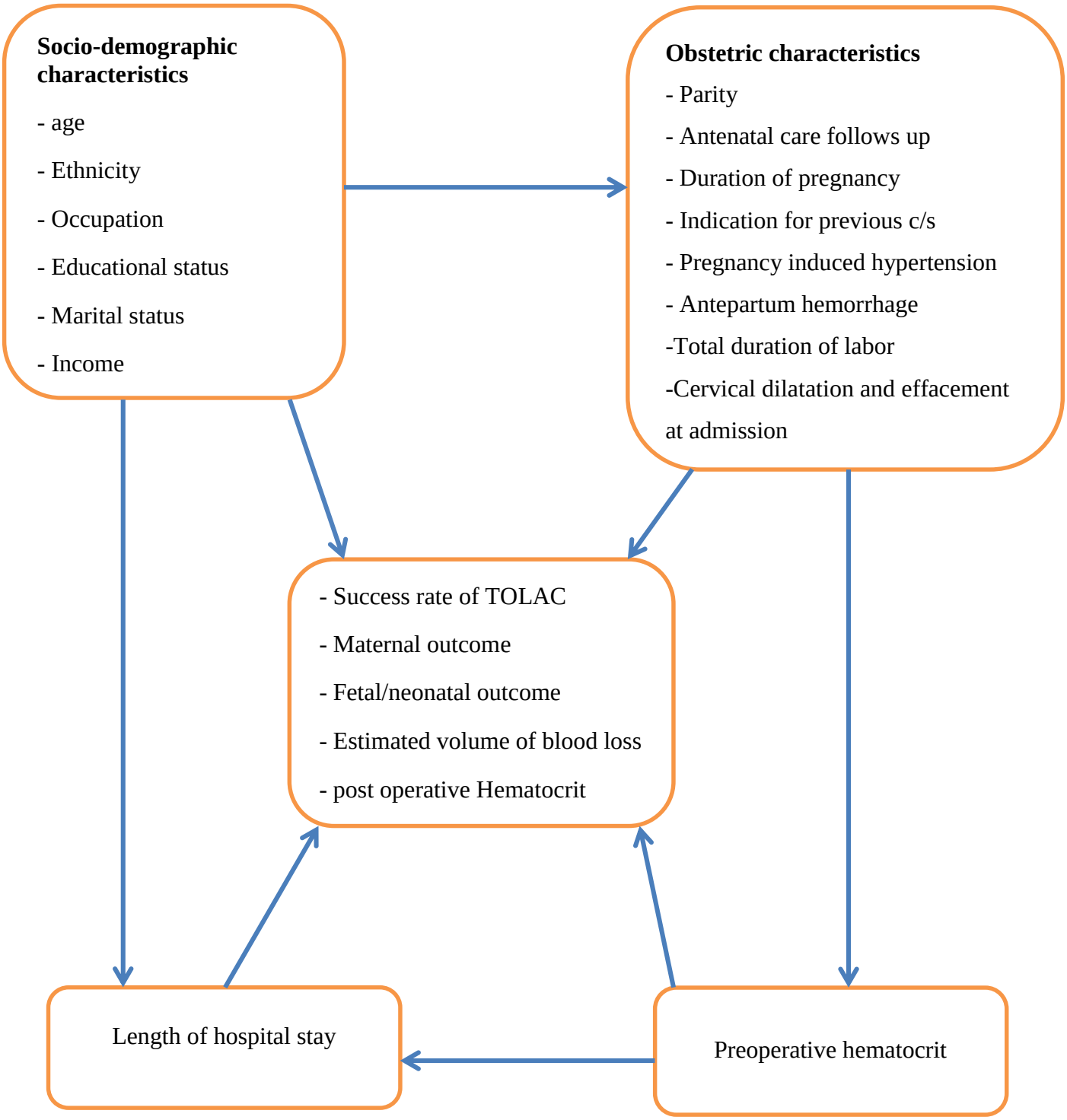
Study done in Pakistan in Obstetrics and Gynecology Unit 'A' of Ayub Teaching Hospital Abbottabad to determine the final outcome of a trial of scar and Vaginal Birth after Caesarean Section (VBAC) from 01.11.2002 to 31.10.2004. A total of 2652 patients were delivered during this period out of which 297 patients had history of one previous caesarean section. A total of 53 patients had an elective repeat caesarean section and rest of 244 was subjected to a trial of scar. Out of 244 patients selected for trial of scar, 165 (67.2%) had a successful uncomplicated vaginal delivery, 7 (3.2%) were delivered by forceps, 11 (5.2%) with vacuum extractor and 61 (24.4%) required a repeat emergency caesarean section. 83% of the patients had a spontaneous onset of labor and 17% needed induction of labor with prostaglandin E2 pessaries and augmentation of the labor with oxytocin. However repeat caesarean section rate was high in the latter group. 71.2% of the babies were born with Apgar score > 8 and 24.6% had Apgar score ranges 6-8. There were 3 cases of scar dehiscence and one case of ruptured uterus and one baby was lost due to this complication. No serious maternal complication occurred [51].

A 5-year retrospective study was carried out at the University of Benin Teaching Hospital in Nigeria between January 1999 and December 2003, to determine the incidence, the maternal and fetal outcome following vaginal delivery after one previous caesarean section with a view to evaluating its safety and efficacy. There were 5234 deliveries, with 395 cases of one previous caesarean section, giving an incidence of 7.5%. The incidences of emergency caesarean section, elective caesarean section and spontaneous vaginal delivery following trial of vaginal delivery were 34.7%, 9.4% and 48.1%, respectively. During the study period there were 1317 cases of caesarean section, giving an incidence of 25.2% caesarean section rate. The incidence of one previous section among all caesarean section births was 30%. The major morbidity following vaginal delivery was uterine rupture with an incidence of 1.5% and hysterectomy of 0.8%. Three of the uterine ruptures occurred before admission because the patients labored at home. One

maternal death occurred as a result of uterine rupture and postpartum hemorrhage, giving a maternal mortality ratio of 19/100,000 and a case fatality rate of 0.3%. The corrected perinatal mortality rate was 15.2/1000, mainly from obstructed labor, abruptio placenta and fetal distress. Both maternal and fetal mortalities from vaginal birth after one previous section were significantly less than the respective overall maternal and fetal mortality from the institution. The 1-minute Apgar score of babies delivered by elective section was significantly ($P < 0.001$) higher than the Apgar score of babies delivered by emergency section and vaginally. There was only one patient with wound dehiscence at elective section without associated perinatal death. [52].

A five-year retrospective study was carried out at the Lagos University Department of Obstetrics and Gynecology, College of Medicine Teaching Hospital in Nigeria to determine the obstetric outcome after a previous Caesarean section and also to identify significant clinical factors that are predictive of successful subsequent vaginal delivery. Hospital records of 101 patients with previous Caesarean births and 105 patients without a previous Caesarean delivery were examined, the latter group serving as control. Successful vaginal delivery occurred in 74 (73.3%)) in the trial group and 90 (85.7%) in the control group. The Caesarean section rate was significantly higher in the trial group ($P < 0.01$). In the trial group, clinical factors found to predict successful vaginal delivery were a history of previous vaginal delivery (88.1%), infants birth weight less than 4kg (75%), gestational age less than 40 weeks (83.2%) and spontaneous onset of labor (82.1%). 63.6% of patients whose indications for previous cesarean section were due to cephalopelvic disproportion/ arrest of labor were successfully delivered vaginally. Uterine rupture/dehiscence occurred in 3 (2.97%) patients. No maternal or perinatal death occurred. We conclude from this study that trial of labor in carefully selected patients with previous Caesarean delivery poses low level of risk for both the mother and the baby and that its use is an important component of efforts to lower the rate of repeat cesarean birth [53].

CONCEPTUAL FRAMEWORK



2.2 Significance of the study

In modern obstetric practice, pregnancy with history of previous cesarean section is quite common. A cesarean section poses some documented risks to the mother's health in subsequent pregnancies like placenta previa or accretes uterine scar rupture. It is also associated with increased likelihood of preterm delivery, low birth weight and perinatal death. Repeat cesarean section is technically difficult and there is chance of injury to surrounding structures. This study will provide with information on the success rate, maternal and perinatal outcomes in a pregnant lady with previous c/s scar who delivers in JUMC and will give the sociodemographic picture of the population. These rates might not reflect the actual ladies with previous c/s scar at the community level, however can give the picture of the most common maternal and perinatal complication associated with pregnant ladies with previous scar in the community. This information will give us the insight on some of the major areas where we need to focus on to improve the success rate and favorable outcomes, our preventive strategies for possible adverse outcomes and treatment of complications to decrease those complications in the population served by JUMC. We will have an evidence to come up with recommendations that can be implemented at community level and an institutional level to decrease maternal and fetal complications associated with previous c/s scar and to increase the success rate.

CHAPTER-THREE OBJECTIVES

3.1 General Objective

To determine success rate of TOLAC, maternal and fetal outcomes, and identify determinant factors of success of trial of labor after previous cesarean delivery (TOLAC) at Jimma University Medical Center, December 2017 - July, 2018.

3.2 Specific Objectives

- To determine the success rate of TOLAC
- To assess maternal antepartum, intrapartum and postpartum outcomes
- To assess fetal/neonatal outcomes of pregnant women with TOLAC.
- To identify determinant factors of success of TOLAC.

CHAPTER-FOUR METHODS AND MATERIALS

4.1 Study Area and Period

The study was conducted at Jimma University Medical Center, Maternity Ward and Labor Unit, in Jimma town from December 2017 to July, 2018.

4.2 Study design

A prospective longitudinal study (general cohort) design was used to follow all pregnant women with previous cesarean delivery. Participants and their newborns were followed from time of admission to maternity or labor ward to the time of discharge after vaginal or emergency repeat cesarean delivery.

4.3 Population

4.3.1 Source population

Source populations will be all women admitted to the labor and maternity ward who had one previous caesarean delivery within the past ten years.

4.3.2 Study population

All pregnant women with previous cesarean delivery and fulfill the inclusion criteria.

4.4 Inclusion and Exclusion criteria

Inclusion Criteria

- Women with a single prior caesarean presenting in their next pregnancy with a single, live fetus in cephalic presentation, who have reached 28 weeks gestation or seven months of amenorrhea or above according to the national viability criteria, and
- Has no contraindication to a planned TOLAC are eligible.
- Volunteer to undergo TOLAC

Exclusion Criteria

Women with any of the following are ineligible:

- more than one prior caesarean birth,
- vertical,
- inverted T or
- previous uterine surgery (including hysterotomy or previous myomectomy involving entry of the uterine cavity or excessive myometrial dissection)
- previous uterine perforation,
- multiple pregnancy
- any contraindication to vaginal birth (including placenta previa, transverse lie, active genital herpes infection)
- contracted pelvic as judged by the clinician
- Lethal congenital anomaly fetal anomaly associated with mechanical difficulties at birth (such as hydrops, fetal ascites, hydrocephalus, omphalocele or cystic hygroma).

The inclusion/exclusion criteria are based on guidelines recommended by the Society of Obstetricians and Gynecologists of Canada, American College of Obstetrics and Gynecology, the Institute for Clinical Systems Improvement, and the National Institute for Clinical Effectiveness (UK).

4.5 Sample size determination and sampling technique

4.5.1 Sample size

Sample size was calculated using single population proportion formula assuming 69.1% success rate of TOLAC, 95% confidence level, 5% margin of error and 405 women fulfilling inclusion criteria over a period of nine months.

$$\frac{Z_{\alpha/2}{}^2}{d^2}\ P(1-P)$$

Where P was the success rate of TOLAC, and d was margin of error. Thus, the minimum sample size was 328. Applying finite population correction formula, the corrected sample size was 182 and with 15% non-response rate, the final sample size was 210.

4.5.2 Sampling technique

All pregnant women who fulfil the inclusion were consecutively involved in the study.

4.5.3 Data collection methods and instruments

Data was collected by face-to-face interview and document review. Pre-tested semi-structured questionnaire and checklist was used as tools for data collection. Three data collector midwives were recruited and supervisor gave orientation on procedures, techniques and ways of collecting the data. The questionnaire was prepared in English and then translated into Afan Oromo and then retranslated back into English to maintain consistency. The questionnaire was developed based on instruments that were applied in different studies related to TOLAC. The questionnaire was pre tested prior to the actual data collection on 20 respondents that were not included in the main survey.

4.6. Study Variables

Dependant variables

-Success rate of TOLAC

-Maternal outcome

-Fetal/neonatal outcome

-Estimated volume of blood loss (mL)

-post operative Hematocrit

Independent variables

Socio-demographic characteristics

- age

- Ethnicity

- Occupation

- Educational status

- Marital status

- Income

Obstetric characteristics

- Parity

- Antenatal care follows up

- Duration of pregnancy

- Indication for previous c/s

- Pregnancy induced hypertension

- Antepartum hemorrhage

-Total duration of labor

-Cervical dilatation and effacement at admission

Medical characteristics

-Preoperative Hematocrit

-Duration of hospital stay before delivery

4.7. Data Quality Assurance

To assure the quality of the data properly designed data collection instrument and training of both data collectors and supervisor was done. The collected data was reviewed and checked for completeness and relevance by the supervisors and principal investigator daily.

4.8 Data Analysis

The completed questionnaire was checked for completeness and consistency by the principal investigator. Code was given to the completed questionnaire. Data was entered and analysed using Epidata version 3.1 and SPSS version 24 computer software packages. Data clean-up was performed to check for accuracy, consistencies and values; any error was then identified and corrected. Analysis of frequencies of different variables and chi-squared test for some selected variables was done. Odds ratio was calculated to determine the strength of association of selected variables. Logistic regression was done to control the effect of each explanatory variable on the outcome variables

4. 9 Data Quality Control

To ensure to quality of data to be gathered from the study subjects, a range of mechanisms will be employed to address major areas of bias introduction during the data collection process. First, the questionnaire will be pre-tested on similar settings and necessary modification was made based on nature of gaps identified in questionnaire. Data collectors were trained on how to gather the appropriate information, procedures of data collection techniques and the whole contents and subject matter of the questionnaire. The data was collected by trained data collectors using standard, structured and pre-tested questionnaire prepared in local language. A day to day on site supervision by the researcher was carried out during the whole period of data collection. At the end of each day, the questionnaire was reviewed and cross checked for completeness, accuracy and consistency by the investigator and corrective discussion was under taken when needed with all the data collectors. Data was cleaned and edited after it was entered in to the software.

4.10 Ethical Clearance

Official letter was obtained from Jimma University (JU) Research and Graduate studies coordinating office and was submitted to the responsible authorities of hospital to have permission for data collection. Verbal consent was requested from every study participant included in the study during data collection time after explaining the objectives of the study. All the information collected from the study subjects was handled confidentially through omitting their personal identification and the data was used for the research purpose only. Data collectors

and supervisors informed the subject that they had a right to participate or not in the study as well as the right to interrupt at any time.

4.11. Dissemination Plan of the Study Findings

The final results of this study will be submitted to the advisors, JU research graduate studies and CBE coordinating office and to publishers for possible evaluation and publication of the paper. A valuable recommendation will be made based on the result obtained at the end of the study that is going to be implemented during the clinical practice in these segments of the population throughout the country.

4.7 Operational and term Definitions

1. Parity – number of delivery experiences. A woman whose first delivery or viable pregnancy was multiples was considered primiparous.
2. TOLAC:-Trial of Labor after Cesarean Delivery with the goal of achieving VBAC.
3. Successful TOLAC: - calculated as the number of VBAC deliveries divided by the number of TOLAC, multiplied by 100.
4. Failed TOLAC: - If cesarean delivery becomes necessary.
5. Index pregnancy: - current pregnancy.
6. Period of gestation: - time period elapsed from conception to delivery or the entire period of pregnancy.
7. Postpartum period: - is clinically defined as the first 6 weeks following childbirth including caesarian and vaginal delivery
8. Immediate Postpartum period: - is the period which includes 48 hours to 42 days after deliver.

CHAPTER FIVE- RESULTS

Socio-demographic Characteristics

A total of 209 participants were involved in this study, giving a response rate of 99.9%. The mean (SD) age of parturient were (27.8, [4.5]) with minimum and maximum age of 18 and 41 respectively. The leading proportion of the participants were in the age group of 25-29yrs, 83(39.7%) and the least was in the age group >34yrs (9.1%). The median (IQR) of total duration of hospital stay for successful TOLAC was 1(1) with minimum and maximum of 0.4 to 13 days, respectively. The mean (SD) duration of hospital stay for failed TOLAC was (3.2, [1.02]), with the minimum and maximum of 1 and 6 days respectively. About half of the participants of the study stayed in the hospital 1-2 days (50.2%). The median (IQR) of 97 participants for whom we obtained information about their income was 2500(3000), with the minimum and maximum of income of 400 to 10,000 Birr. Majority (109, [52.2%]) of participants were from rural. Most of the participants were Oromo (154, [73.7%]) and Muslims (148, [70.8%]). The majority of participants were housewife (140, [67.0%]). Concerning educational backgrounds, the leading percentage (79, [37.8%]) of the participants attended 1-8 grades. All of them are married (Table 1)

Table 1: Socio-demographic/economic characteristics of mothers who undergone TOLAC, JUMC, December 2017 – July 2018.

Socio-demographic characteristics		Number	%
AGE(years)	<25	42	20.1
	25-29	83	39.7
	30-34	65	31.1
	>34	19	9.1
ADDRESS	Rural	109	52.2
	Urban	100	47.8

Duration of Hospital Stay	<1	12	5.7
	1-2	105	50.2
	3-4	81	38.8
	5+	11	5.3
Ethnicity	Oromo	154	73.7
	Amhara	27	12.9
	Dawuro	13	6.2
	Gurage	12	5.7
	Others (Wolaita,Silte)	3	1.4
Religion	Muslim	148	70.8
	Orthodox	43	20.6
	Protestant	18	8.6
Occupation	Housewife	140	67.0
	Merchant	34	16.3
	Civil Servant/employee	32	15.3
	Farmer	3	1.4
Educational Status	cannot read and write	36	17.2
	read and write only	22	10.5

	grades 1-8	79	37.8
	grades 9-12	44	21.1
	Diploma	3	1.4
	Degree	25	12.0
Marital	married	209	100.0

Obstetric characteristics

The leading proportion of participants were para I (74, [35.4%]). The median (IQR) of parity was 2 (2) with minimum and maximum parity of 1 and 8 respectively. Almost all (206, [98.6%]) had ANC follow up and nearly half (46.6%) of them were at health center (figure 1).

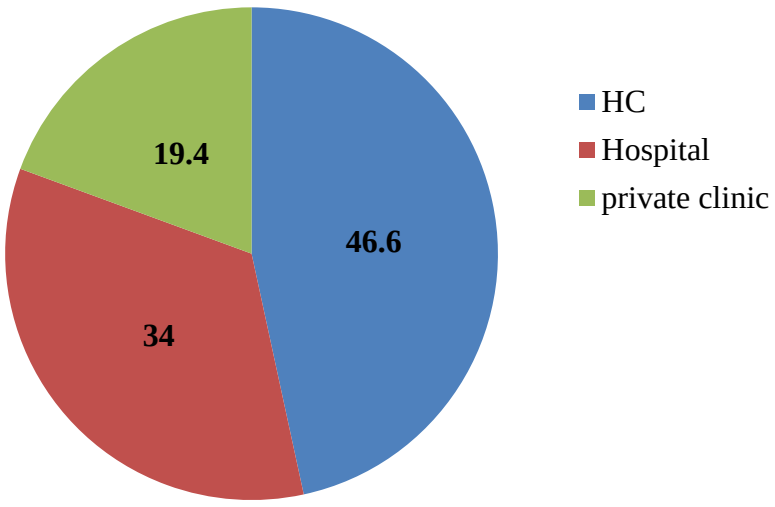


Figure 1.Distribution of place of ANC follow up among mothers, who tried labor after previous C/S, JUMC, December 2017 to July 2018.

Of those participants who remembered their gestational age and those we could able to calculate their GA depending on the information that is collected from patient charts (159 [76.1%]) , the mean (SD) gestational age was (38.8, [1.7]), the minimum and maximum GA were 31 to $41^{+5/7}$ weeks respectively. Majority of them were 37-39 weeks (49.3%).

The median (IQR) for interval from previous pregnancy (years) was 3(1.5), the minimum and maximum interval from previous pregnancy (years) was 1 and 10 years respectively

Concerning duration of labor, the mean (SD) of labor (hrs.) for successful TOLAC was 10.2(3.2), while the median (IQR) for failed TOLAC was 10(4) with the minimum and maximum of 6 and 24 hrs respectively.

The leading indication of previous cesarean section was for NRFHR 70 (33.5%), followed by CPD 43 (20.6%). Most of the patients 190(90.9%) had alive pregnancy in the previous pregnancy. Majority of the patients 148(70.8%) had interval of 2 or more years. Almost half (47.4%) of the participants of the study were admitted during latent phase of the labor (table 2).

Table 2: Obstetric characteristics of mothers who tried labor after previous C/S, JUMC, and December 2017- July 2018

Obstetric characteristics		Number	%
Parity	I	74	35.4
	II	54	25.8
	III	50	23.9
	IV	18	8.6
	V+	13	6.2
Gestational age (GA) (n=)	<37	21	10.0
	37-39	103	49.3
	≥40	85	40.7

Indication of previous CS	Malpresentation	32	15.3
	APH	14	6.7
	NRFHR	70	33.5
	Failed induction	26	12.4
	Unknown	24	11.5
	CPD	43	20.6
Outcome of previous pregnancy	alive	190	90.9
	dead	19	9.1
Interval of pregnancy	<2	61	29.2
	≥2	148	70.8
Phase of labor on admission	Latent (<4cm)	99	47.4
	Active (≥4cm)	96	45.9
	second stage	14	6.7
Labor duration	<8	44	21.1
	8-9	47	22.5
	10-12	80	38.3
	>12	38	18.2

Nine of the participants (4.3%) had major complications for the index pregnancy of which 4 were complicated by hypertensive disorders of pregnancy, 3 were by PROM and/or Preterm labor and the remaining 2 were by anemia.

Two (0.9%) of the study participants had history of admission to maternity ward of which one of them was admitted with the diagnosis of hypertensive disorders of pregnancy and another was admitted with the diagnosis of preterm labor.

Success Rate of TOLAC and Maternal and Neonatal Outcomes

The success rate of TOLAC was 133 (63.6%) where 16 (12.0%) and 5 (3.8%) of them were assisted by forceps vaginal delivery (FVD) and by vacuum vaginal delivery (VVD). Nineteen (9.1%) of the participants had intrapartum complications. The leading intrapartum complication was NRFHRP making 89.5% of the total intrapartum complications. The other intrapartum complications were 2 cases of vaginal bleeding of which one was secondary to abruption placenta and the cause of bleeding for the second one was not identified. There was one case of uterine scar dehiscence which was initially decided for emergency c/s for NRFHRP.. There was also another case with lower abdominal tenderness which was suspected for scar dehiscence, however it was found out to be normal inra-operatively. Maternal complications encountered in five cases of successful TOLAC, two of them were complicated by PPH and other two cases by endometritis and one case of perineal tear.

For those who delivered by C/S, the leading indications were prolonged latent phase of labor (28, [36.8%]), arrest of labor (20, [26.3%]), NRFHR (14, [18.4%]) and CPD (11, [14.5%]) (figure 2).

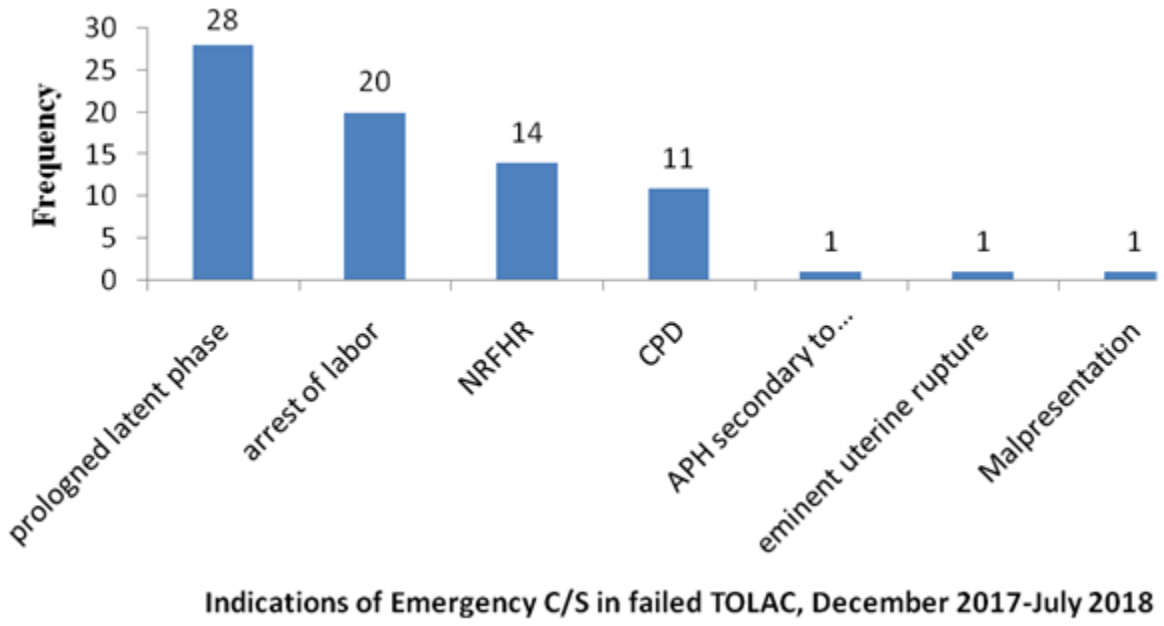


Figure 2.Distribution of indications for emergency C/S among mothers who failed trial of labor after previous C/S (TOLAC) at JUMC, December 2017 – July, 2018.

Among those who delivered by emergency C/S, 22 (28.9%) mothers had intra op and 7 (9.2%) had post op complications. The most frequent intra op complications was adhesion (19, [82.6%])

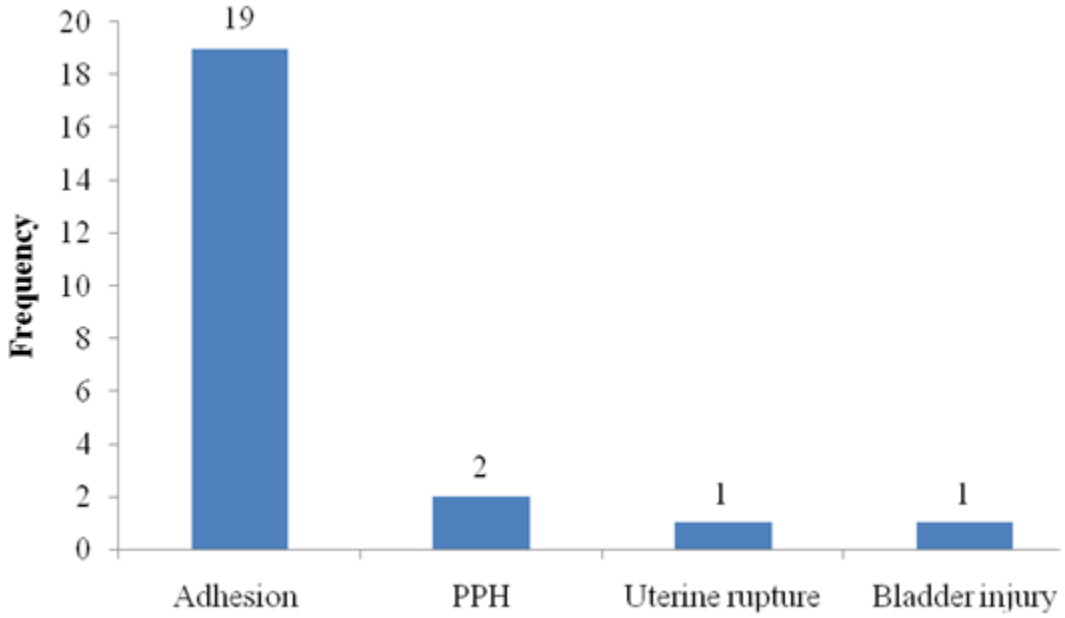


Figure 3. Distribution of maternal intra OP complications among mothers who undergone emergency C/S after failed trial of labor after previous C/S (TOLAC) at JUMC, December 2017 – July 2018.

The observed post op complications were five cases of endometritis and two cases of wound infection.

The median (IQR) of blood loss for successful TOLAC was 300(200) with the minimum and maximum of 100 to 1500ml; as for failed TOLAC the median (IQR) of blood loss was 500(138), the minimum and maximum of blood loss was 300 and 1200ml respectively.

The mean (SD) of Pre op HCT was 37.0(2.9), the minimum and maximum of pre op HCT was 27% and 47.4% respectively. We have post op HCT for 31 participants of successful TOLAC, the mean (SD) of post op HCT of participants of the study was 34.1 (2.6), the minimum and maximum being 29 and 39.5% respectively. As for failed TOLAC the mean (SD) of post op HCT was 33.3(4.1), the minimum and maximum post op HCT was 22% to 45.6%. The mean (SD) of birth weight was 3274.1(460.6), the minimum and maximum birth weight was 1500 to 4400 grams respectively.

A total of 3 neonatal deaths were observed out of which 2 happened among neonates of mothers with successful TOLAC. The leading proportion (57, [43.5%]) of newborns of successful TOLAC had Apgar score of 7 followed by 8 (44, [33.6%]). Similarly, the leading proportion (34, [45.3%]) of newborns of failed TOLAC had Apgar score of 7 followed by 8 (29, [38.7%]) (figure 4). Only five newborns had birth weight ≥ 4000 grams.

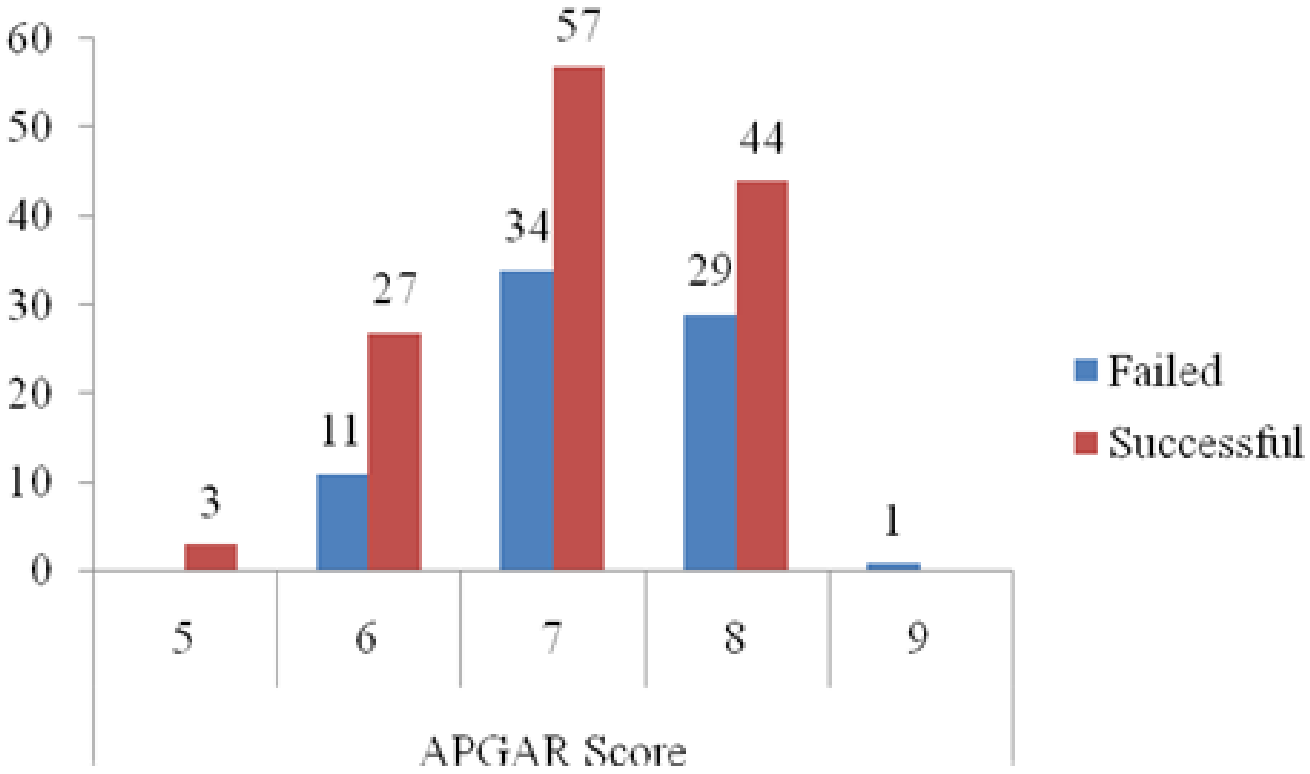


Figure 4 Apgar score of newborns of mother who tried labor after previous C/S (TOLAC) at JUMC, December 2017 –July, 2018.

A total of eight neonates had complications out of which six occurred among neonates of mothers with successful TOLAC. The most frequent neonatal complication was RDS

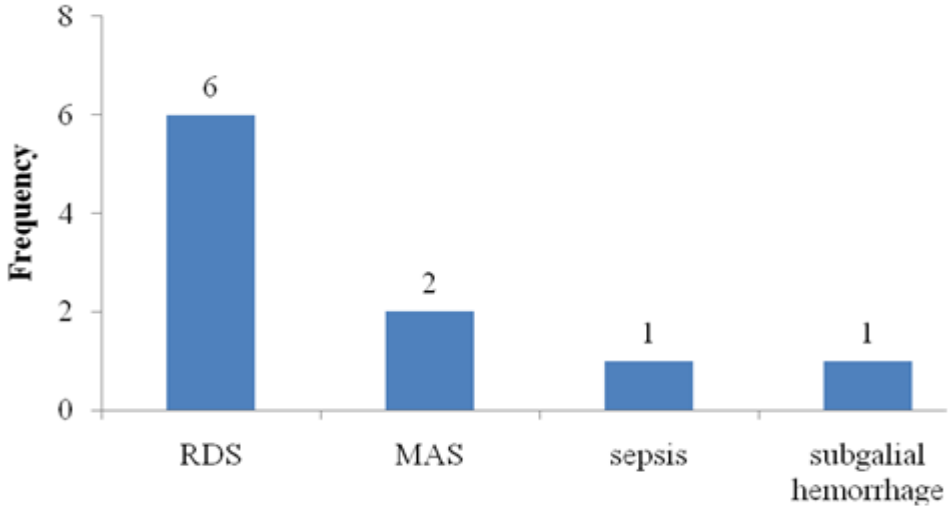


Figure 5 Distribution of neonatal complications among mothers who tried labor after previous C/S, JUMC, December 2017 – July, 2018.

Factors Associated with TOLAC Success

Bivariate binary logistic regression was performed to identify variables candidate for multiple logistic regression and a total of 7 variables were found to be candidates at p-value less than 0.2 (table 3)

Table 3: Bivariate logistic regression of characteristics of mothers who tried labor after previous C/S, JUMC, December 2017– July, 2018.

Patient characteristics		TOLAC		p-value	COR (95% C.I)
		Successful	Failed		
Occupation	Housewife/farmer	98	45		
	Civil servant/employee	18	14	.187*	.590(.270, 1.291)
	Merchant	17	17	.045*	.459(.215,.981)
Place of ANC	Hospital	40	21	.778	.906(.455, 1.803)
	Health center	61	29		
	Private clinic/none	32	26	.123*	.585(.296, 1.156)
Outcome of previous pregnancy	Alive	124	66		
	Dead	9	10	.128*	.479(.185, 1.237)
Indication of previous C/S	NRFHR	54	16		1
	Malpresentation	19	13	.068*	.433 (.176,1.064)

	APH	7	7	.045*	.296 (.090,.971)
	Failed induction	15	11	.064*	.404 (.155,1.052)
	Unknown	16	8	.313	.593 (.215,1.636)
	CPD	22	21	.005*	.310 (.137,.703)
Interval from previous pregnancy	≤2	32	29		
	>2	101	47	.032*	.513(.279, .945)
Phase of labor	Latent	48	51		
	Active	73	23	.000*	3.372(1.828, 6.221)
	Second stage	12	2	.019*	6.375(1.356, 29.975)
Parity	1	28	35	.000*	.312(.169, .577)
	>1	105	41		

* Statistically significant (candidate for multiple LR) at p-value < 0.2

In multivariable (multiple) logistic regression, a total of 4 variables were found to be statistically significantly associated with outcome of TOLAC.

A mother whose indication for previous C/S was CPD had more than 64% lower chance of having successful TOLAC (AOR: 0.358, 95% CI: 0.141, 0.907) compared to a mother whose indication for previous C/S was NRFHR.

A mother whose indication for previous C/S was malpresentation had more than 66% lower chance of having successful TOLAC (AOR: 0.335, 95% CI: 0.120, 0.938) compared to a mother whose indication for previous C/S was NRFHR. Similarly, a mother whose interval from previous pregnancy was less than 2 years, had 55% lower chance of having successful TOLAC (AOR: 0.450, 95% CI: 0.222, 0.910) compared to a mother whose interval from previous pregnancy was greater than or equal to 2 years. A mother whose phase of labor was active and second stage was more than 2 times (AOR: 2.415, 95% CI: 1.236, 4.719) and more than 4 times

(AOR: 4.551, 95% CI: 1.030, 22.949) respectively at chance of having successful TOLAC compared with mother whose phase of labor was latent. Para one mother had more than 60% reduced chance of having successful TOLAC compared with para two and above mother (AOR: 0.395, 95% CI: 0.200, 0.782) (table 4).

Table 4Factors independently associated (multivariable LR) with success of TOLAC in mothers who tried labor after previous C/S, JUMC December 2017 – July2018.

Patient characteristics		TOLAC		COR (95% C.I)	AOR (95% C.I)
		Successful	Failed		
Indication of previous C/S	NRFHR	54	16	1	1
	Malpresentation	19	13	.433 (.176,1.064)	.335 (.120,.938)*
	APH	7	7	.296 (.090,.971)	.309 (.080,1.196)
	Failed induction	15	11	.404 (.155,1.052)	.383 (.135,1.088)
	Unknown	16	8	.593 (.215,1.636)	.559 (.181,1.729)
	CPD	22	21	.310 (.137,.703)	.358 (.141,.907)*
Interval from previous pregnancy	≤2	32	29	.513(.279, .945)	.450 (.222,.910)*
	>2	101	47	1	1
Phase of labor	Latent	48	51	1	1
	Active	73	23	3.372(1.828, 6.221)	2.415 (1.236,4.719)*
	Second stage	12	2	6.375(1.356, 29.975)	4.551 (1.030,22.949)*
Parity	1	28	35	.312(.169, .577)	.395 (.200,.782)*
	>1	105	41	1	1

CHAPTER SIX: DISCUSSION

In a developing country like Ethiopia where the prevalence of cesarean delivery is rising and fertility rate is still high, the trial of labor after CS should be considered and encouraged in a woman who has no contraindications to reverse rising cesarean rate, its complications and economic burden (9, 10, and 11).

In our study successful TOLAC was achieved in around two-third of women with one previous CS. Of those, the majority had spontaneous vaginal delivery and 15% had assisted vaginal delivery due to either prolonged second stage or fetal distress. This is in accordance with the results found in other studies, which demonstrate success rate of VBAC ranging from 60.0%-80.0% [14, 29, 54-58, 83].Studies in some other low-income countries showed a higher rate of successful TOLAC with strengthening and careful selection (79.6-83.5%) [41, 59], which is higher than our finding. Though some studies in low-income countries have shown a much lower success rate of TOLAC, ranging from as low as 27.4% to 53.6% [47, 61, 62], which is inconsistent with our finding. Surprisingly, the lower success rate of TOLAC from African emigrants in Australia was reported in the recent studies too [18].Their finding had also been supported by other findings which demonstrated ethnic disparity in success of TOLAC [74, 75]. Meanwhile, 36.4% of the study participants underwent emergency repeat cesarean section (ERCS), where majority of those are due to poor progress of labor/prolonged latent phase of labor or cervical dilatation arrest and NRFHR. These reasons appear to be similar with findings in other African settings [49, 62].

A significant relationship between some obstetric variables and the outcome of subsequent delivery was evident in this study. Thus women who had successful VBAC were more likely to be parity (≥ 2) compared to those who had ERCS. A similar finding was previously reported by authors who investigated the outcome in women with planned TOLAC in comparison to ERCS and to those undergoing vaginal birth. They found that a significant higher percentage of successful TOLAC was in women of multi-parity. On the contrary, another study found that women with successful trail of labor were of lower parity [48]. The discrepancy with our study finding could be due to research design and sample characteristics.

Our study revealed that the chance for successful TOLAC in women with prior vaginal delivery was higher, compared to women with no history of prior vaginal delivery, as has been described in literature several times. This result is in agreement with others who have reported that, prior vaginal delivery is apparently the strongest predictor of successful VBAC [48, 56, 79, 80-82]. More than two-third of the women in the successful TOLAC group had a longer spacing period (≥ 24 months) between their previous CS and their present pregnancy, compared with those who had a duration <24 months. Such finding was supported others too who analyzed the different factors associated with successful trial of labor after previous one lower segment cesarean delivery [18, 67]. He reported that one of the factors that were found to be significantly associated with successful trial of labor is inter pregnancy interval longer than 24 months. This finding is inconsistent with the reports of Birara M. et al (49)

This study revealed that the majority of the successful TOLAC group had been in the participants admitted in the active first stage (considered 4cm and 100% effacement) and second stage of labor compared with parturients admitted with latent first stage of labor. Those who were admitted with active first stage of labor had a strong likelihood of vaginal delivery than those admitted at latent first stage of labor. This is due to high frequency of false labor and slow progress in the latter which is consistent with a study which found that, failure of progress was the most common indication of ERCS [48, 60]. Poor progress was mostly likely diagnosed if the mother presented early in labor [49], which is consistent with our finding.

Induction and augmentation of labor is contraindicated in JUMC protocol for patients with one previous C/S, resulting in emergency repeat caesarean section when a patient is diagnosed as poor progress of labor, in contrast to guidelines in the developed world such as USA (54) and UK (87) that allow for augmentation and induction of labor in patients with one previous caesarean delivery. Studies have also found that induction & augmentation of labor was associated with an increased successful VBAC rate in these populations [72, 73]. Labor induction& augmentation for women with a prior caesarean delivery is considered acceptable practice by ACOG [54]. The lack of augmentation in patients diagnosed with poor progress of

labor may be partially responsible for a relatively lower success rate of TOLAC at JUMC compared to those quoted in developed countries [64].

Gestational age was not found a significant predictor of success in this study, although gestational age and birth weight have been significantly associated with trial of labor outcome in literature. Studies have showed a negative association between gestational age and likelihood of VBAC. One case-control study found that for women with gestational age greater than 36 weeks, the likelihood of VBAC significantly decreased with each week (60). A retrospective cohort study of 2,775 women demonstrated that gestational age greater than 40 weeks was significantly associated with a decreased likelihood of VBAC compared with those with gestational age less than 40 weeks, for both spontaneous and induced labor [45]. Smith et al. (63) concluded that a TOLAC was likely to be unsuccessful at 41 weeks or 42 weeks gestation compared to a TOLAC at 40 weeks, and Coassolo et al. (75) reported a 31.3% TOLAC failure rate at 40 weeks or beyond, against 22% in <40 weeks. Abdelazim et al also have similar findings in their study (18). In our case, the finding could also be confounded by high number of unknown dates and ascertainment of correct date was not possible.

With regard to birth weight, studies demonstrated that birth weight greater than 4,000 g was associated with a lower likelihood of vaginal delivery [65,66,88]. In our study, the finding could also be confounded by few number of birth weight above 4000gm.

History of still birth was one parameter which was associated with poor success in our studies and it is in line with the investigations that was done by Birara et al at Addis Ababa University [63]

From known indications CPD and malpresentation were associated with poor success. Breech presentation was not found significant determinant as opposed to other reports which

consistently reported favoring successful vaginal delivery because of its less recurrence [66-69], which could be explained in our finding by few number of participants of the study whose previous indication for cesarean delivery was breech. Other possible speculations were sampling bias and recall bias of previous indication of c/s.

In this study, neonatal intensive care admission was significantly higher in the successful TOLAC group. Out of eight admissions, six were occurred among neonates of mothers with successful TOLAC, Compared to the successful group. This contradicts the findings of Ball et al. and Tan et al. reported increases in risks of neonatal morbidities after unsuccessful TOLAC [18, 70, and 84].

A total of 3 neonatal deaths were observed out of which 2 happened among neonates of mothers with successful TOLAC. Making the perinatal mortality rate (PNMR) of 14.4 per thousand. There was no maternal death. Other studies had demonstrated that there were no differences in neonatal outcomes [41,88]

Among those who delivered by emergency C/S, 22 (28.9%) mothers had intra op and 7 (9.2%) had post operation complications. The most frequent intra operation complication was adhesion. There was also one case of iatrogenic bladder injury intraoperatively among those failed TOLAC. Scar dehiscence was found in 1 (0.5%) case of participants of the study with is in line with study done by Abdelazim et al in which they found in 1 (0.9%) case of unsuccessful TOLAC(18). There are other publications too, which had found increased rate of complications in successful TOLAC which they have commented "*While complication rates were higher in the vaginal delivery group, vaginal tears, which are a relatively minor complication, appear to increase this rate (88.)*

In multivariable (multiple) logistic regression, a total of 4 variables were found to be statistically significantly associated with outcome of TOLAC. Stage of labor at admission, parity, a mother whose indication for previous C/S was NRFHR, and interval from previous pregnancy. This finding is very close to the study done by who found that previous vaginal delivery, spontaneous labor, and cervical dilatation ≥4cm were all a predictive variables of success VBAC. Recently two studies in India about "Prognostic factors for successful vaginal birth after cesarean section" found that, maternal age, prior vaginal delivery, neonatal weight, inter-conceptional period, and prior CS indication were all statistically significant predictors of successful VBAC [85, 86].

Limitation of the study

It is a single tertiary hospital based study so it may not be representative for a larger community. Sample size was also another limitation which was affected mainly by the duration of the study period.

There could also be a possibility of recall bias at reporting the indications of past cesarean section and absence of data on the indications for previous CS, and the limited number of cases.

Documentation on important variables, like occupational status, educational status, blood loss, post-delivery hematocrit and medical illness was not good which has made these variables to be excluded from analysis

We found out in our study that appropriate and carefully selected candidates has desired outcome in TOLAC. We believe that with careful selection of pregnant mothers who fulfill the criteria, TOLAC is a very good option and successful, especially in a low-resource settings like our country. We recommend large scale study to consider revision of the management guideline protocol on the issue of augmenting labor in women with previous one c/s scar with oxytocin unless there be other obstetric contra-indication.

REFERENCES

1. Cragin EB, Conservatism in obstetrics. NY Med J. 1916; 104:1–3.

2. Lavin JP, Stephens RJ, Miodovnik M, et al. Vaginal delivery in patients with a prior cesarean section. Obstet Gynecol. 1982;59:135–148.

3. Flamm BL, Newman LA, Thomas SJ, et al. Vaginal birth after cesarean delivery: results of a 5-year multicenter collaborative study. Obstet Gynecol. 1990;76:750–754.

4. Miller DA, Diaz FG, Paul RH. Vaginal birth after cesarean: a 10-year experience. Obstet Gynecol. 1994;84:255–258.

5. Centers for Disease Control and Prevention (CDC) Rates of cesarean delivery— United States 1991. MMWR Morb Mortal Wkly Rep. 1993;42:285–289.

6. Cesarean Childbirth: report of a Consensus Development Conference. Sponsored by the NICHD in conjunction with the National Center for Health Care Technology and assisted by the Office for Medical Applications of Research. Washington, DC: NIH Publication; 1981. pp. 82–2067.

7. Appropriate technology for birth. Lancet. 1985;2:436–437.

8. Menacker F, Declercq E, Macdorman MF. Cesarean delivery: background, trends, and epidemiology. SeminPerinatol. 2006;30:235–241.

9.Yisma E, Smithers LG, Lynch JW, Mol BW. Cesarean section in Ethiopia: prevalence and sociodemographic characteristics. J Matern Fetal Neonatal Med. 2017 Nov 20:1-6.doi: 10.1080/14767058.2017.1401606. [Epub ahead of print]

10. The American College of Obstetricians and Gynecologists Practice Bulletin—Clinical Guidelines for Obstetrician-Gynecologists. Vaginal birth after previous cesarean delivery. No 184, November 2017. *Obstet Gynecol. 2017 Nov; 130(5):e217-e233*

11. Curtin SC. Rates of cesarean birth and vaginal birth after previous cesarean, 1991–95. Mon Vital Stat Rep. 1997;45(11 Suppl 3):1–12.

12. Sachs BP, Kobelin C, Castro MA, et al. The risks of lowering the cesarean-delivery rate. N Engl J Med. 1999;340:54–57.

13. Phelan JP. VBAC: time to reconsider? OBG Management. 1996;8:64–68.

14. Caughey AB, Shipp TD, Repke JT, et al. Rate of uterine rupture during a trial of labor in women with one or two prior cesarean deliveries. Am J Obstet Gynecol. 1999;181:872–876. [PubMed]

15. Martin JA, Hamilton EB, Sutton PD, et al. Births: final data for 2006. Natl Vital Stat Rep. 2009; 57:1–104.

16.Wen SW, Huang L, Liston R, et al. Severe maternal morbidity in Canada, 1991-2001. CMAJ 2005; 173:759.

17. Jourdan E. Triebwasser, Marjorie C. Treadwell, Kenneth Piehl, Cosmas Van De Ven, Roger D. Smith; Trends in trial of labor after cesarean and incidence of uterine rupture; AJOG

18. Abdelazim et al. Obstetric risk factors of TOLAC J Turk GerGynecolAssoc 2014; 15: 245-9

19. Belizan J, Althabe F, Barros F, Alexander S. Rates and implication of caesarean sections in Latin America: ecological study. BMJ. 1999;319:1397–1402.

20. Iglesias S, Burn R, Suanders D. Reducing the caesarean section rate in a rural community hospital. Can Med assoc J. 1991;154(11):1459–1464.

21.National Institute of Health. Vaginal Birth After Caesarean: New Insights. 2010.

22. Ikechebelu JI, Mbamara SU, Afuba AN. Vaginal birth after one caesarean section: A review of the practice at Nnewi, Southeast Nigeria. J Med Med Sci. 2010;1(7):309–313.

23. Nkwo PO, Onah HE. Feasibility of reducing the caesarean section rate at the University of Nigeria Teaching Hospital, Enugu Nigeria Teaching Hospital, Enugu Nigeria. Trop J Obstet Gynecol. 2002;19(2):86–89.

24. Sebhatu B. An experience with trial of scar in 66 Ethiopian women.EAMJ. 1994;71:676–78.

25. Vanhaecht K, Witte K, Depretere R, Sermeus W. Clinical pathway audit tool: systematic review.JNur Man. 2006;14:529–37. doi: 10.1111/j.1365-2934.2006.00705.x.

26. RCOG: The Sentinel National Caesarean Section Audit Report- RCOG Clinical Effectiveness Support Unit. RCOG Press; 2001.

27. AIHW: Australia's mothers and babies 2000. In Perinatal Statistics Series Number 12. Sydney, ; 2003.

28. Hamilton BE, Martin JA, Sutton PD: Birth: Preliminary data for 2002. Natl Vital Stat Rep 2003, 51:4-5

29. MacDorman M, Declercq E, Menacker F (2011)Recent trends and patterns in cesarean and vaginal birth after cesarean (VBAC) deliveries in the United States. ClinPerinatol 38: 179-192

30. Mastrobattista JM: Vaginal birth after cesarean delivery. Obstetrics and Gynecology Clinics of North America 1999,26 :295-304.

31. Curtin SC, Kozak LJ, Gregory KD: U.S. cesarean and VBAC rates stalled in

the mid-1990's. Birth 2000, 27:54-57.

32. Chan A, Scott J, Nguyen A, Keane R: Pregnancy outcome in South Australia, 2000.Adelaide, Pregnancy Outcome Unit, Epidemiology Branch, Department of Human Services; 2001.

33. Menacker F: Trends in cesarean rates for first births and repeat cesarean rates for low-risk women: United States, 1990-2003. Natl Vital Stat Rep 2005, 54:1-8.

34. Guise JM, Eden K, Emeis C, et al. Vaginal birth after cesarean: new insights. Evidence Report/Technology Assessment No. 191 (Prepared by the Oregon Health & Science University Evidence-based Practice Center under contract no. 290-2008-10057-I).AHRQ Publication No. 10-E003. Rockville (MD): Agency for Healthcare Research and Quality; 2010.

35. McMahon MJ, Luther ER, Bowes WA, Jr, et al. Comparison of a trial of labor with an elective second cesarean section. N Engl J Med. 1996;335:689–695.

36. Hibbard JU, Ismail MA, Wang Y, Te C, Karrison T, Ismail MA. Failed vaginal birth after a cesarean section: how risky is it? I. Maternal morbidity. American journal of obstetrics and gynecology 184:7 2001 Jun pg 1365-71; discussion 1371-3.

37. Pregnancy outcome after one previous caesarean section at a tertiary university teaching hospital in Tanzania ,Pembe, A. B.Othman, M. K.Tanzania Journal of Health Research 2010 Vol. 12 No. 3 pp. 188-194

38. DrKapilSlongMynso, DrThNonibala Devi, Dr L Ranjit Sing. Study of Vaginal Birth after Caesarean Section. JMSCR Vol||04||Issue||07||Page 11448-11456||July

39. Shruti S.G, Mahima T, Hariharan C, Deepti S.S. Outcome of post caesarean pregnancy and comparison of maternal and foetal outcome following vaginal birth versus repeat caesarean section in a rural hospital. Int J ReprodContraceptObstetGynecol 2013;2 (1):16-22.0

40. Vidyadhar BB, Purushottam AG, Kunaal KS, and Satyajit PG. Vaginal Birth after Caesarean Section. N Am J Med Sci. 2013;5 (2):140–144

41. Balachandran L, Vaswani PR, Mogotlane R. Pregnancy outcome in women with previous one caesarean section. J ClinDiagn Res 2014;8 (2):99-102.

42. Tongsong T and Jitawong C. Success rate of vaginal birth after caesarean delivery at Maharaj Nakorn Chiang Mai Hospital. J Med Assoc Thai 2003;86(9):829-35.

43. Lai SF and Sidek S. Delivery after a lower segment caesarean section. Singapore Med J 1993;34(1):62-6.

44. Annals of African Medicine Vol. 4, No. 3; 2005: 113 – 117 TRIAL OF LABOR AFTER A PREVIOUS CAESAREAN SECTION DELIVERY: A PRIVATE HOSPITAL EXPERIENCE O. C. Ezechi, B. K. E. Kalu, F. O. Njokanma, V. Ndububa, C. A. Nwokoro and G. C. E. Okeke

45. Tan PC, Subramaniam RN and Omar SZ. Predictors for caesarean delivery and neonatal admission after trail of labor in women with one previous lower segment caesarean scar. Singapore Med J 2008;49 (3):188-192.

46. Anwar S, Ahmad S, Abbasi N, Anwar MW. Effects of birth weight on success of vaginal birth after caesarean delivery. Gomal J Med Sci 2015;13 (1):46-8.

47. M. Madaan, S. Agrawal, A. Nigam, R. Aggarwal& S. S. Trivedi: Trial of labor after previous caesarean section: The predictive factors affecting outcome

48. Zaitoun MM, Eldin SAN, Mohammad EY (2013) A Prediction Score for Safe and Successful Vaginal Birth after Cesarean Delivery: A Prospective Controlled Study. J Women's Health Care 2: 129. doi:10.4172/2167-0420.1000129)

49. Birara M and Gebrehiwot Y. Factors associated with success of vaginal birth after one caesarean section (VBAC) at three teaching hospitals in Addis Ababa, Ethiopia: a case control study. BMC Pregnancy and Childbirth 2013,13 (1):31

50. Spong CY, Landon MB, Gilbert S, et al. National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units (MFMU) Network. Risk of uterine rupture and adverse perinatal outcome at term after cesarean delivery.Obstet Gynecol. 2007;110:801–807.

51. Hassan A, Trial of scar and vaginal birth after caesarean sectioninPakistan.Journal of Ayub Medical College, Abbottabad : JAMC 17:1 pg 57-61

52. Aisien, A.O. &Oronsaye, A.U. (2004) Vaginal birth after one previous caesarean section in a tertiary institution in Nigeria. Journal of Obstetrics and Gynaecology 24, 886- 90.).

53. Ola ER, Imosemi OD, Abudu OO, Vaginal birth after one previous Caesarean section--evaluation of predictive factors. Department of Obstetrics and Gynaecology, College of Medicine, University of Lagos and Lagos University Teaching Hospital, Idi-Araba, Lagos, Nigeria.African journal of medicine and medical sciences 30:1-2 pg 61-6

54. ACOG Practice bulletin no. 115: Vaginal birth afer previous cesarean delivery. ObstetGynecol 2010 Aug;116(2 Pt 1):450-63.

55. E. Ashwal, A. Wertheimer, A. Aviram, A. Wiznitzer, Y. Yogev, and L. Hiersch, "Prediction of successful trial of labor afer cesarean - Tebeneft of prior vaginal delivery," *Te Journal of Maternal-Fetal and Neonatal Medicine*, vol. 29, no. 16, pp. 2665– 2670, 2016.

56. Macones G, Cahill A, Pare E, Stamilio DM, Ratcliffe S et al., (2005) Obstetric outcomes in

women with two prior cesarean deliveries: is vaginal birth after cesarean delivery a viable option?.Am J ObstetGynecol 192: 1223-1228.

57. S. Gupta, S. Jeeyaselan, R. Guleria, and A. Gupta, "An Observational Study of Various Predictors of Success of Vaginal Delivery Following a Previous Cesarean Section," *Te Journal of Obstetrics and Gynecology of India*, vol. 64, no. 4, pp. 260–264, 2014.

58. H. E. Knight, I. Gurol-Urganci, J. H. Van Der Meulen et al., "Vaginal birth afer caesarean section: A cohort study investigating factors associated with its uptake and success," *BJOG: An International Journal of Obstetrics & Gynaecology*, vol. 121, no. 2, pp. 183–192, 2014.

59. A. Soni, C. Sharma, S. Verma, U. Justa, P. K. Soni, and A. Verma, "A prospective observational study of trial of labor afer cesarean in rural India," *International Journal of Gynecology and Obstetrics*, vol. 129, no. 2, pp. 156–160, 2015.

60. Gonen R, Tamir A, Degani S, Ohel G (2004) Variables associated with successful vaginal birth after one cesarean section: a pro-posed vaginal birth after Cesarean score. Am J Perinatol 21: 447-453.

61. A. Agarwal, P. Chowdhary, V. Das, A. Srivastava, A. Pandey, and M. T. Sahu, "Evaluation of pregnant women with scarred uterus in a low resource setting," *Journal of Obstetrics and Gynaecology Research*, vol. 33, no. 5, pp. 651–654, 2007.

62. Mokaya et al. Johannesberg, 2016

63. Smith GC, White IR, Pell JP, Dobbie R. Predicting cesarean section and uterine rupture among women attempting vaginal birth after prior cesarean section. PLoS Med 2005; 2: e252. [CrossRef]

64. Hill JB, Ammons A, Chauhan SP. Vaginal birth after cesarean delivery: comparison of ACOG practice bulletin with other national guidelines. *ClinObstet Gynecol*. 2012; 55: 969-77.

65. Ugwumadu A: Does the maxim "once a caesarean, always a caesarean" still hold true? PLoS Med 2005, 2(9):e3053.

66. Cecatti JG, Pires HMB, Faúndes A, DuarteOsis MJ: Factors associated with vaginal birth after previous cesarean section in Brazilian women. Rev PanamSaludPublica 2005, 18(2):107–113.

67. Up-to-date version 16.3, vaginal birth after cesarean delivery: 2008

68. Boulvain M, Fraser WD, Brisson-Carroll G, Faron G, Wollast E: Trial of labor after caesarean section in sub-Saharan Africa: a meta-analysis. BJOG 1997, 104:1385–1390.

69. Jodie MD, Caroline AC, Janet EH, Ross RH, Jeffery SR: Vaginal birth after caesarean. BMC Childbirth and Pregnancy 2007, 7:17.

70. 701. Ball E, Hinshaw K. The current management of vaginal birth after previous cesarean delivery. The Obstetrian&Gynaecologist 2007; 9 : 77-82. [CrossRef]

71. Belihu FB, Small R and Davey MA: Trial of labor and vaginal birth after previous caesarean section: A population based study of Eastern African immigrants in Victoria, Australia. Midwifery 2017

72. Stock, S.J., Ferguson, E., Duffy, A., Ford, I., Chalmers, J., Norman, J.E., 2013. Outcomes of induction of labor in women with previous caesarean delivery: a retrospective cohort study using a population database. PLoS One 8, e60404.

73. Palatnik, A., Grobman, W.A., 2015. Induction of labor versus expectant management for women with a prior cesarean delivery.American Journal of Obstetrics and Gynecology 212, 358. http://dx.doi.org/10.1016/j.ajog.2015.01.026.

74.Hollard, A.L., Wing, D.A., Chung, J.H., Rumney, P.J., Saul, L., Nageotte, M.P., Lagrew, D., 2006. Ethnic disparity in the success of vaginal birth after cesarean delivery. The Journal of Maternal-Fetal Neonatal Medicine 19, 483–487.

75. Coassolo KM, Stamilio DM, Paré E, Peipert JF, Stevens E, Nelson DB, Macones GA. Safety and efficacy of vaginal birth after cesarean attempts at or beyond 40 weeks of gestation. ObstetGynecol 2005; 106: 700-6.

76. Flamm BL, Geiger AM. Vaginal birth after cesarean delivery: an admission scoring system. Obstet Gynecol. 1997;90:907–910.

77. Macones GA, Hausman N, Edelstein R, Stamilio DM, Marder SJ. Predicting outcomes of trials of labor in women attempting vaginal birth after cesarean delivery: a comparison of multivariate methods with neural networks. Am J Obstet Gynecol. 2001;184:409–413.

78. Pickhardt MG, Martin JN, Meydrech EF, et al. Vaginal birth after cesarean delivery: are there useful and valid predictors of success or failure? Am J Obstet Gynecol. 1992;166:1811–1819.

79. Lydon R, Cahill AG, Spong CY (2010) Birth after previous cesarean delivery: short-term maternal outcomes. SeminPerinatol 34: 249-257

80. Landon MB, Hauth JC, Leveno KJ, et al; National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. N Engl J Med. 2004;351:25812589.

81. Hendler I, Bujold E. Effect of prior vaginal delivery or prior vaginal birth after cesarean delivery on obstetric outcomes in women undergoing trial of labor. Obstet Gynecol. 2004;104(2):273–277.

81. Caughey AB, Shipp TD, Repke JT, Zelop C, Cohen A, Lieherman E. Trial of labor after cesarean delivery: the effect of previous vaginal delivery. Am J Obstet Gynecol. 1998;179(4):938–941.

83. Harper LM, Macones GA (2008) Predicting success and reducing the risks when attempting vaginal birth after cesarean. ObstetGynecolSurv 63: 538-545.

84. Tan PC, Subramaniam RN, Omar SZ. Labor and perinatal outcome in women at term with one previous lower-segment Cesarean: A review of 1000 consecutive cases. ANZJ ObstetGynaecol 2007; 47(1):31-6.

85. Haresh UD, Rohit KJ, Aarti AV (2010) Prognostic factors for successful vaginal birth after ceseran section - Analysis of 162 cases. J ObstetGynecol India 60: 498-502.

86. Guise JM, Denman MA, Emeis C, Marshall N, Walker M, et al. (2010) Vaginal birth after cesarean: new insights on maternal and neonatal outcomes. ObstetGynecol 115: 1267-1272.

87. RCOG Birth after Previous Caesarean Birth; Green-top Guideline No. 45 October 2015

88. *Mehmet BakiSenturk et al* Factors associated with successful vaginal birth after cesarean section and outcomes in rural area of Anatolia; International Journal of Women's Health 2015:7

ANNEX I: QUESTIONNAIRE

JIMMA UNIVERSITY FACULTY OF MEDICAL SCIENCES, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, QUESTIONNAIRE FORMAT ON SUCCESS RATE, MATERNAL AND NEONATAL OUTCOME OF PREGNANT WOMENN WITH PREVIOUS CESAREAN SCAR DELIVERIES IN OBSTETRICS WARD OF JUSH, JIMMA, SOUTH WEST ETHIOPIA, December, 2017

INSTRUCTIONS: You are kindly requested to answer all questions genuinely.

PART I – SOCIODEMOGRAPHIC INFORMATIONS

1. Age in years ……. Card number……...

2. Address ……. date of admission ……

Time of admission……. date of discharge…….

3. Ethnicity (MARK THE APPROPRIATE ANSWER)

A. Oromo
B. Amhara
C. Tigre
D. Gurage
E. Dawro
F. others (specify)……

4. Religion

A. Muslim

B. Orthodox Christian

C. Protestant

D. Others (specify) ……

5. Occupation

a. House wife

b. Civil servant (employee)

c. Farmer

d. Merchant

e. Others (specify)…….

6. Educational status

a) Illiterate (can't read & write)

b) Read &write only

c) Grade 1-8

d) Grade 9-12

e) Grade >12 (specify)……

7. Marital status

a) Married

b) Separated

c) Divorced

d) Widowed

8. Income of the family per month _____Birr.

PART-II OBSTETRIC CONDITION

1. Gravidity……...

2. Parity…….

3. ANC follow-up….

a) yes

b) No

4. If yes for question number 2. where was it?.....

a. Hospital

b. Health center

c. Others (specify)…….

5. Gestational age…….

A. If known

a. LNMP ……in weeks.

b. Early ultrasound (earlier than 24 weeks)…….weeks

B. if unknown- a. length of amenorrhea (in months) …….

b. Fundal height (in centimeters) …….

6. Indication for previous c/s…….

a) NRFHRP

b) CephaloPelvic Disproportion

c) Malpresentation

d) Failed induction

e) Placenta previa

f) Cord prolapsed

g) Obstructed labor

h) Footling breech

i) Un known indication

j) Others(specify)……

7. Outcome of previous pregnancy.

    a. alive

    b. dead

8. Interval between c/s and current pregnancy……in months.

9. Antepartum complication during the index pregnancy.

    a. HDP

    b. APH(specify)

    c. Anemia

    d. Scar tenderness

    e. Others (specify)……

f. none

10. Was she admitted to maternity ward during the current pregnancy?

a. yes

b. no

c. . If yes, reason for admission…….

11. Phases of labor at admission to labor ward.

a. latent 1st stage of labor (<4cm)

b. active 1st stage of labor (≥4cm, 100% effacement)

c. second stage of labor

12. Status of fetal membrane.

a. intact

b. ruptured

13. Total duration of labor…….in hours

14. Intrapartum complication…….

a) Yes

b) No

15. if 'Yes' for question number 14, what was the complication?

a. vaginal bleeding

b. lower abdominal tenderness

c. NRFHRP

d. scar dehiscence

e. uterine rupture

f. no complication

g. ROM

h. PTL

16. Mode of delivery of index pregnancy.

a. spontaneous vaginal delivery

b. vacuum delivery

c. forceps delivery

d. emergency c/s

17. If the root of delivery was vaginal, Was there any complication during and after delivery? If the route of delivery is emergency CS, please jump to question #19.

a. yes

b. no

18. If yes for question number 17, what was the complication?

a. PPH

b. retained placenta

c. endometritis

d. blood transfusion

e. scar dehiscence

f. perineal tear

g. others(specify)……..... (please, jump to question #24)

19. Indication for emergency c/s?

a. NRFHRP

b. protracted labor

c. arrest of labor

d. prolonged latent phase of labor

e. CPD

f. imminent uterine rupture

g. others(specify)……

PART III-maternal morbidity

20. was there intra operative complications?

a) yes

b) no

21. If yes, for Q.1 what was the complication?

a. adhesion

b. scar dehiscence

c. bladder injury

d. hysterectomy

e. bowel injury

f. blood transfusion

g. Others(specify)…….

h. none

22. Was there postoperative complication? A. Yes B. No

23. If yes, for Q.3 what was the complication?

a. PPH

b. wound infection

c. wound dehiscence

d. endometritis

e. others(specify)……

24. Estimated blood loss……in ml (for both vaginal and cesarean delivery).

25. pre-op and post op hematocrit……and……. Respectively (For emergency CS cases)

PART IV. Neonatal outcome

a. alive

b. dead

26. If alive a. APGAR score in the 1^{st}…..... 5^{th} minute ……

b. Weight…….in gram.

27. Was any neonatal complication. A. YesB.No

28. if ‘Yes’ for question #27, what was the complicatin?

a. Sepsis

b. Respiratory distress syndrome

c. Meconium Aspiration Syndrome

d. Others(specify)……

e. No complication.

Name of data collector_____

Signature_____

Date_____

Declaration

I, the undersigned, declare that this thesis is my original work and have never been presented in this or any other university and that all the resources material used for the thesis have been fully acknowledged

Name_____

Signature_____

Name of the institution_____

Date of submission_____

This thesis has been submitted for examination with my approval as a university adviser

1st adviser: name_____

Signature_____

Date_____

2nd adviser: name _____

Signature_____

Date_____