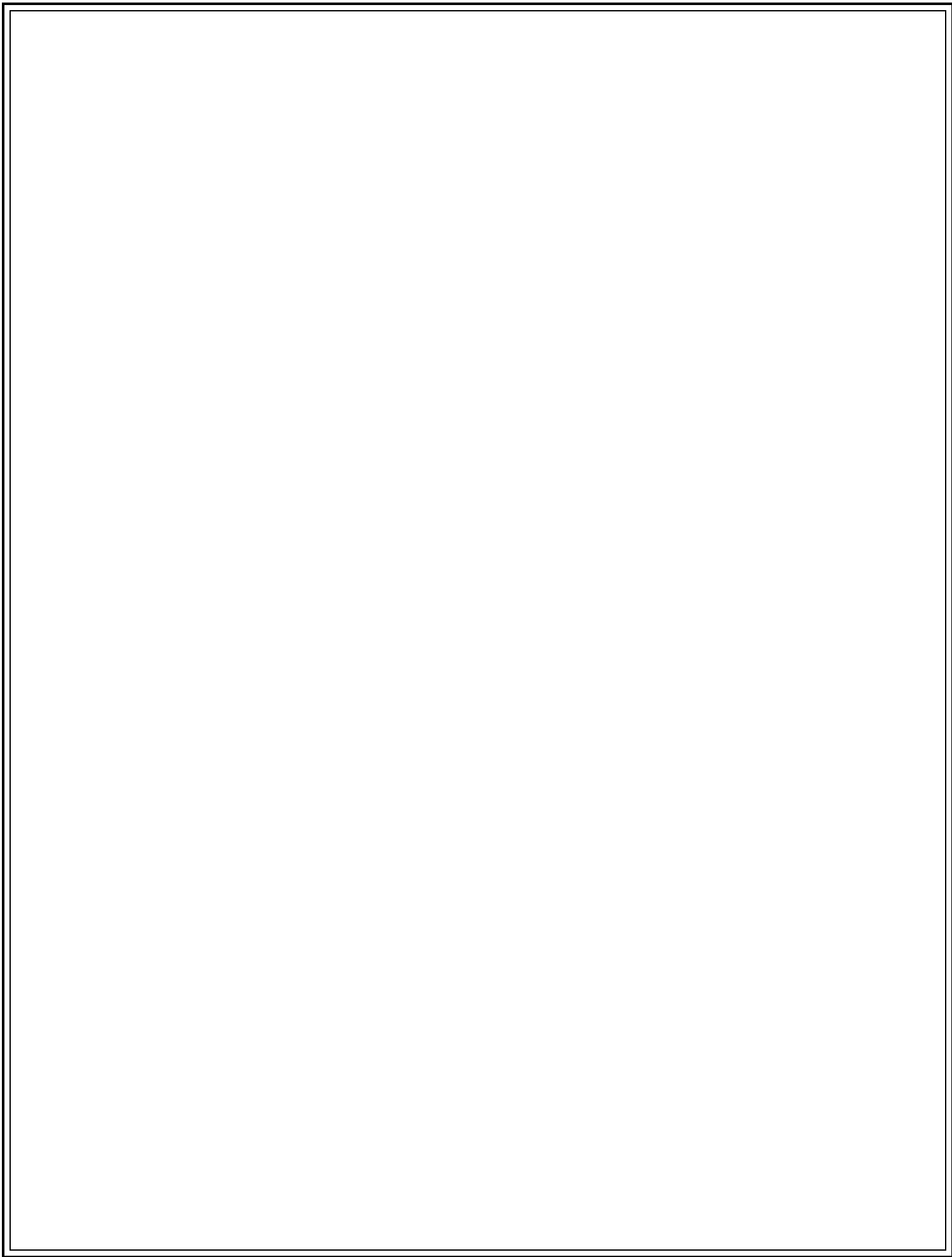




SUCCESS OF VAGINAL BIRTH AFTER CESAREAN SECTION AND ASSOCIATED FACTORS IN SELECTED HOSPITALS, ADDIS ABABA, ETHIOPIA

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Abstract

Background: Vaginal birth after previous cesarean delivery has less maternal morbidity and mortality than elective repeat cesarean delivery. However, the success of vaginal birth after cesarean delivery may not be predicted accurately because a standardized prediction tool may not accurately tell us which women are going to have a successful vaginal delivery. Therefore, knowing the success rate and associated factors will help to counsel patients on the possible outcome and decide on the mode of delivery.

Objectives: To assess the success of vaginal birth after one cesarean section and associated factors in selected hospitals in Addis Ababa Ethiopia from December 2021 to June 2022.

Methods: Facilitybased a cross-sectional study has been conducted in St. Paul's Hospital Millennium Medical College, Ras Desta Damtew Hospital, Minilik II Referral Hospital,

Abebech Gobena MCH center, in Addis Ababa from December 2021 to March 2022. The total sample size was 258. All Pregnant women with one previous cesarean section who opted for trial of labor was selected, Registration book, patient interview, and charts have been reviewed using a review checklist. Data were checked and entered using Epi Info window version 7.1 and analyzed using Statistical Package for Social Science (SPSS) window version 26. Descriptive analysis has been carried out. A binary and multiple logistic regression analysis has been carried out. Data have been described and presented using tables, charts, and graphs. An odds ratio with a 95 percent confidence interval and 5% level of precision has been used for data interpretation.

Result; in the study success rate of VBAC was (55.4%) 95% CI, [49.34, 61.46]. The factors associated with success of vaginal birth after one cesarean section were high cervical dilation, ruptured membrane during admission and age above 35 years. The commonest indication for cesarean section being NRFHRP and followed by prolonged labor.

Conclusion - this study showed lower rate of successful vaginal birth after cesarean section than study done in Ethiopia. Current intrapartal factors play major role in the success of TOLAC. In this study success has increased with cervical dilation greater than 4 centimeters, and membrane rupture at the time of admission. The commonest indication for the cesarean section was NRFHRP and followed by prolonged latent stage of labor.

Keywords-success of VBAC

INTRODUCTION

Background

Cesarean delivery (C/D) is defined as birth of a fetus from the uterus through an abdominal incision, i.e. Delivery of the fetus via laparotomy and hysterotomy after fetal viability(1,2).Cesarean delivery could be *Primary cesarean* refers to a C/D done in a woman without a priorcesarean birth, or *repeat cesarean* refers to a C/D done in awoman who had a cesarean birth in a previous pregnancy(1,2).Cesarean delivery is designed to prevent or treat life-threatening maternal or fetal complications.WHOrecommended at a rate of C/D 5–15 % of all births(3). The national 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(4).

There is a huge disparity among regions despite overall improvement in C/D rate. The highest C/D rate was reported in Addis Ababa (29%) followed by Harari (21%) and Diredawa (19%). On the other hand, the lowest C/S rate was recorded in Somali region (3%) followed by SNNPR and Oromia each at 4%.If the C/D rate is not between 5-15% of the total expected deliveries, it shows that either women needing C/S service are not getting it (if <5%) or women are receiving unnecessary C/D (if >15%)(5).

A successful trial of labor after caesarean section (TOLAC) is defined as spontaneous or instrumental (assisted by vacuum or low forceps) delivery to a woman undergoing TOLAC despite the neonatal outcome(6).The success rate of cesarean section is about 60-80%(7,8).After cesarean delivery the mode of delivery depends on the presence or absence of contraindications for vaginal delivery(8).

The following are selection criteria for TOLAC; One previous lower uterine segment caesarian section, Clinically adequate pelvis, Labor should start spontaneously, Singleton pregnancy, Cephalic presentation, No malposition and malpresentation, No other uterine anomalies, noscars or previous uterine repair for rupture, Estimated fetal weight less than 4000 gms, informed consent.(9)

Physicians immediately available throughout active laborcapable of monitoring labor and performing an emergency cesarean delivery(1). The reduction in the VBAC increased the rate of cesarean section (1).

Selected clinical factors are associated with success rate of VBAC

- Increased probability(strong predictors)-prior vaginal birth, spontaneous labor
- Decreased probability- recurrent indications like dystocia, increased maternal age, non-whiteethnicity, gestational age greater than 40 weeks, maternal obesity, preeclampsia, short inter-pregnancy interval, increased fetal weight(10).
- Although there is no universally agreed on discriminatory point, evidence suggests that women with at least a 60–70% chance of VBAC have equal or less maternal morbidity when they undergo TOLAC than women undergoing elective repeat cesarean delivery(10,11).

Women with previous cesarean sections constitute a high-risk group in obstetrics, with associated medical and legal implications(12).Vaginal birth after caesarean delivery (VBAC)

has long been proposed as a viable measure to reduce overall caesarean delivery rates in both developed and developing countries. It has been found to be safe with careful patient selection and good management of labor with success rates ranging between 60% and 80% (13).

The success of VBAC may not be predicted accurately because standardized prediction tool may not tell us which women are going to have successful vaginal delivery accurately(8). Knowing the predicting factors and the success rate will help counsel patients on possible outcome and decide on the mode of delivery(14). The erroneous thought of patients on the success rate of VBAC can be answered like if they do have an answered questions on the mode of delivery and the perinatal out come and on maternal mortality we can address their concerns and erroneous thoughts will be addressed by comparing repeat cesarean section with VBAC(13,15). There is an increasing rate of cesarean section but no evidence shows significant reduction in maternal and prenatal out come by cesarean delivery, so it should not be done unless it is clinically indicated. Mothers who gave birth vaginally has the lowest mortality, shorter hospital stay, less thromboembolic events, less risk of bladder bowel or risk of hysterectomy(15).Evidence suggests that women with at least a 60–70% chance of VBAC have equal or less maternal morbidity when they undergo TOLAC than women undergoing elective repeat cesarean delivery(11,16).

Since vaginal birth after cesarean section is being practiced and there in no research done in recent years in the selected hospitals and little is known on the success rate and the associated factors for success of VBAC in these hospitals. Having research might help us in counseling and developing institutional based guideline for the benefit of our patients. Understanding the influences of factors on VBAC could provide sufficient evidence to assess chances for achieving a successful vaginal delivery among women with prior C/D. It also could help the

clinician provide evidence-based counseling about VBAC, which has important implications on avoiding repeated C/D.

OBJECTIVES OF THE STUDY

3.1 General objectives

- To assess the success of vaginal birth after cesarean delivery (VBAC) and associated factors in selected hospitals Addis Ababa, Ethiopia.

3.2 Specific objectives

- To assess the success of vaginal birth after cesarean delivery in selected hospitals Addis Ababa, Ethiopia.
- To assess factors associated with success of vaginal birth after cesarean delivery in selected hospitals Addis Ababa, Ethiopia

METHODS

4.1 Study area and Period

The study has been conducted in selected hospitals in Addis Ababa Ethiopia. This study was conducted at St.paul's Hospital millennium Medical College, Ras Desta Damtew Hospital, Minilik II Referral Hospital, Abebech Gobena MCH center. These hospitals serve as referral centers for many facilities in Addis Ababa and for countryside hospitals. SPHMMC is one of the tertiary hospitals in Addis Ababa, with an average monthly delivery of around 816 of which cesarean section accounts for 48.18%. RDDH is one of the hospitals found in Addis Ababa city administration with an average monthly delivery of 386 of which 45.2%. DMRH is also found in Addis Ababa city administration with an average monthly delivery of 280 of which cesarean section accounts for 45.2%. Abebech Gobena MCH center is found in Addis Ababa city administration with an average monthly delivery of 912 of which cesarean section accounts for 38.4%.

The study has been conducted from December 2021 to March 2022.

4.2 Study design

Facility-based cross-sectional study design has been employed to assess the success of VBAC and associated factors.

4.3 Population

Source population

All pregnant women who delivered at the selected hospitals from December 2021 to March

Study population

All pregnant women with one lower uterine segment transverse previous cesarean section that are candidate and opted for TOLAC who delivered at the selected hospitals from December 2021 to March 2022

4.4 Study variables

Dependent variable- Success of VBAC

Independent variables

- Socio-demographic variables-Age, address, occupation, marital status, educational level
- Ante-partal variables -Previous indication, history of SVD, birth outcome of previous delivery, inter-pregnancy interval, gestational age, parity
- Intra-partal and fetal variables - membrane status, presence of co-morbid condition, cervical status, birth weight of the fetus, fetal station.

4.5 sample size determination

To determine the sample size for the study, the following assumption will be made: a confidence level of 95% ($Z^2_{\alpha/2} = 1.96$) a 5 % margin of error ($d=0.05$) and a proportion of 60-80 %⁽²⁾.

The required sample size of the study will be calculated using the formula for a single population proportion.

$$n=246$$

5 % for incomplete and inconsistent data = 12

A total of 258 mothers were involved in the study.

Inclusion and exclusion criteria

Inclusion criteria – Pregnant women with one previous cesarean section opted for trial of labor and delivered at the selected hospitals from December 2021 to March 2022.

Exclusion criteria- mothers who are not willing to participate in the study were excluded from the study.

4.6 Sampling procedure

All mothers who had one cesarean delivery, candidate and opted for TOLAC have been taken consecutively till the targeted sample size is achieved. The hospitals were selected based on convenience sampling method. The proportion of sample size taken from each selected hospital is based on the average number of deliveries they have.

4.7 Data collection procedures

4.7.1 Data collection tool

Maternal interview, record review checklist has been prepared to review registration book and charts

4.7.2 Data collectors

Data were collected by four trained midwives who are not working in the labor ward. Data collectors have been trained for one day about the procedure prior to data collection. One

general practitioner has been recruited as a supervisor to monitor the data collection process on a daily bases at each site.

4.7.3 Data collection technique

Data collection technique-Maternal interview, chart review, registration book and charts have been reviewed.

4.8 Data quality management

Any error or ambiguity and incompleteness have been corrected accordingly. The data was cleaned up before analysis.

4.9 Data analysis

Data have been checked and entered using Epi Info window version 7.1and analyzed using Statistical Package for Social Science (SPSS) window version 26. Descriptive analysis has been carried out. The binary logistic regression analysis has been carried out to identify potential predictors of VBAC success rate with a predetermined level of association ($P < 0.25$) and to avoid the confounding effect.

Multiple logistic regressions have been carried out to identify variables that actually affect the success rate of VBAC. Data has been described and presented using tables, charts and graphs. Odd ratio with a 95 percent confidence interval and a 5% level of precision has been used for data interpretation.

4.10 Operational Definitions

Success - women who had previous one cesarean section and who gave birth vaginally.

Failure- those who opted for trial of labor and gave birth by cesarean section

Candidate-mothers who have one lower segment transverse uterine cesarean section scar and don't have contra-indication for vaginal delivery.

4.11. Ethical consideration

Ethical clearance has been obtained from the institutional review board (IRB). Permission paper was sought from SPHMMC. Identification of study participants by name has been avoided to assure the confidentiality of the information obtained.

4.12. Dissemination of the result

The finding of this study will be presented and submitted to SPHMMC. Then after approval by the department, the finding will be communicated to different concerned organizations, like the federal ministry of health and Addis Ababa health bureau. Finally, there will be an attempt to publish the finding in a reputable journal.

5. RESULT

5.1. Socio demographic characteristics

In this study two hundred fifty eight subjects were participated yielding a response rate of 100%. One hundred thirty eight (53.5%) were within the age category of 26-30 years. Two-hundred fifty (96.9%) were from urban areas. While 257(99.6%) and 145(56.2%) were married and orthodox religion followers respectively. Regarding educational level and occupation, 99(38.4%) and 171(66.3%) had completed primary school and were housewives respectively. (See table given below).

Table 1. Socio-demographic characteristics- women with one previous cesarean section who opted for TOLAC and delivered at the selected hospitals from December 2021 to March 2022.

Variables	Frequency(n=258)	Percentage (%)
Age group		
20-25	57	22.1
26-30	138	53.5
31-35	46	17.8
>=36	17	6.6
Religion		
Orthodox	145	56.2
Muslim	91	35.3
Protestant	22	8.5
Educational Status		
Uneducated	23	8.9
Primary school	99	38.4
Secondary school	75	29.1
Tertiary school	61	23.6
Marital Status		
Married	257	99.6
Divorced	1	.4
Occupation		
Farmer	5	1.9
Housewife	171	66.3
Student	3	1.2
Civil servant	48	18.6

Merchant	24	9.3
Others	7	2.7
Residence		
Rural	8	3.1
Urban	250	96.9

5.2. Past Obstetric Performance

Two hundred thirty-seven (91.9%) had inter-pregnancy intervals of greater than eighteen months, 101(39.1%) of indication for previous C/S was non-reassuring fetal heart rate pattern, 251(97.3%) of the outcome of the previous C/S was alive birth. Thirty five (13.6%) had history of successful VBAC and 75(29.1%) had history of vaginal delivery. Two hundred thirty three(90.3%) had parity of less than three. (See table 2).

Table 2. Past Obstetric Performance among women with one previous cesarean section who opted for TOLAC and delivered at the selected hospitals from December 2021 to June 2022.

Variables	Frequency(n=258)	Percentage (%)
Inter-Pregnancy Interval		
6-18months	21	8.1
Greater than 18 months	237	91.9
History of Vaginal delivery		
Yes	75	29.1
No	183	70.9
History of Successful VBAC		
Yes	35	13.6
No	223	86.4

Health Outcome of Previous C/S		
Alive	251	97.3
Dead	7	2.7
Indication for previous C/S		
NRFHRP	101	39.1
Mal-presentation	51	19.8
CPD	2	.8
APH	6	2.3
Macrosomia	21	8.1
Abnormal labour progress	49	19.0
Unknown	28	10.9
Parity		
<3	233	90.3
>3	25	9.7

5.3.Current Obstetric history

Two hundred twenty five (87.2%) of the study participants gestational age was known. Of those with known gestational age, 125(55.5%) gave birth with gestational age of 39-41 weeks. While 194(75.2%) had ruptured membrane at admission and 144(55.8%) of the mothers had ruptured membrane with clear meconium during admission. Comorbidity was apparent among 26(10.1%) of the clients.81.8% of the clients had cervical dilation of 0-4cm at admission. Caesarean delivery was done in 115(44.6%) of client and the commonest indication was

NRFHRP 31(27%) followed by prolonged LFSOL 23(20%). Whereas 244(94.6%) gave birth with a normal fetal weight (2.5-4 Kg).

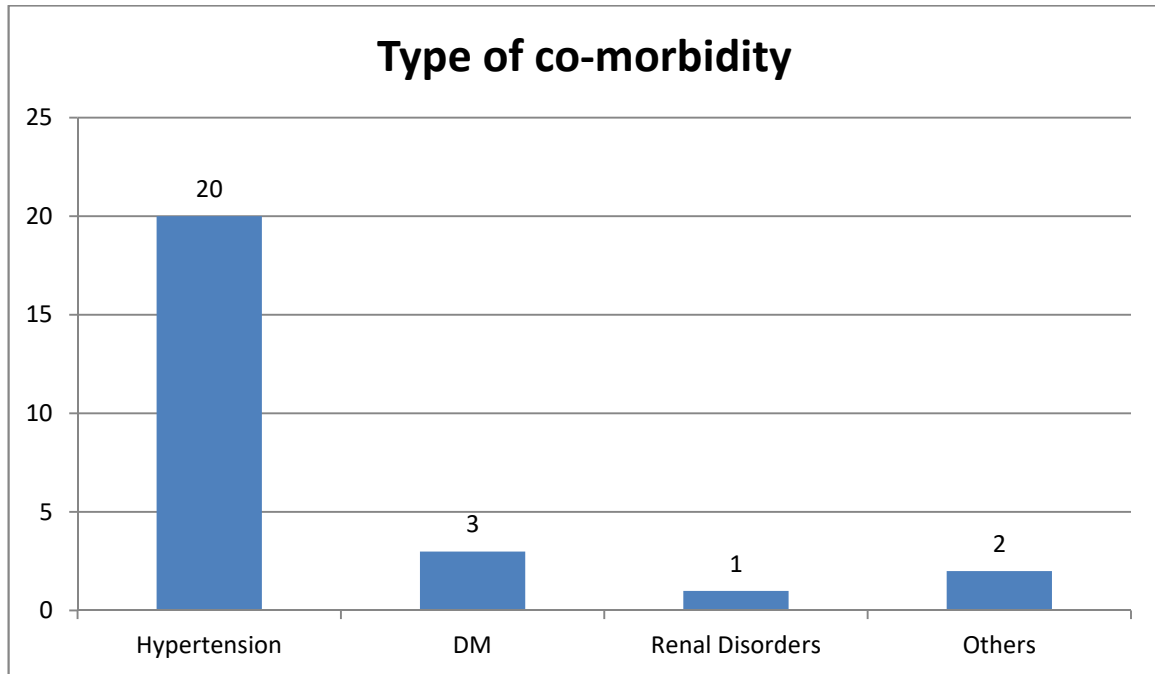


Figure 2. Type of co-morbidity among women with one previous cesarean section who opted for TOLAC and delivered at the selected hospitals from December 2021 to June 2022.

5.4.SUCCESS OF VAGINAL BIRTH AFTER ONE CESAREAN SECTION

Success of vaginal birth after one cesarean section in this study was 143 (55.4%) 95% CI, [49.34, 61.46] (See figure below).

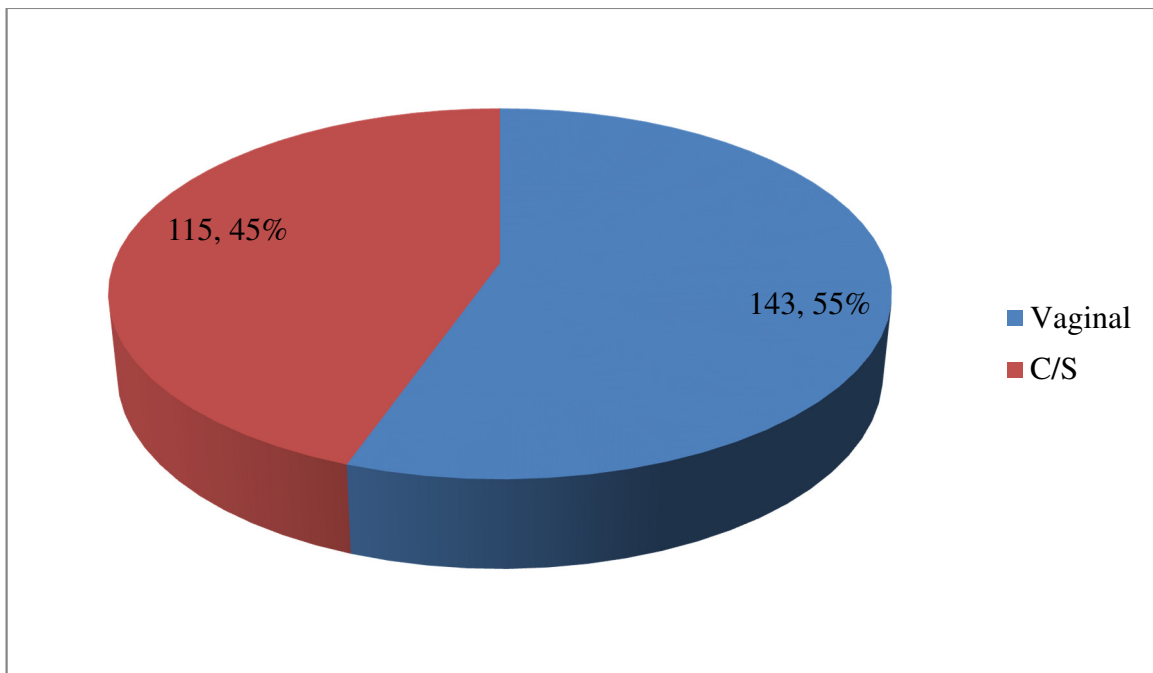


Figure 1. Success of vaginal birth after one cesarean section among women with one previous cesarean section who opted for TOLAC and delivered at the selected hospitals from December 2021 to June 2022.

5.5. Factors associated with success of vaginal birth after one cesarean section

Both Bivariable and multivariable logistic regression analyses employed so as to identify factors associated with success of vaginal birth after one cesarean section. Nine variables were checked whether they are candidate for the multivariable model. Goodness of the fit was checked. Accordingly, three variables of the six variables in the multivariable model were found to have statistical significant association with success of vaginal birth after one cesarean section. With that regard, those mothers with a ruptured membrane at admission had 20% times increased chance of successful vaginal birth after one cesarean section as compared to their counter parts [AOR=1.2, 95% CI(1.098,1.407)]. Also, those mothers with age greater than 35 had 2.7 times increased odds of successful vaginal birth after one cesarean section as compared to those with age between 20-25 years [AOR=2.75 95%CI (2.772,3.443). Likewise, mothers with cervical dilation of 4-10cm at admission had 83.3% times increased odds of successful vaginal birth after one cesarean section as compared to their counter parts AOR=1.833 95% CI(1.074,1.875) (See table given below in the next page).

Table 3. Bivariable and Multivariable Logistic Regression analyses of factors associated with success of vaginal birth after one cesarean section among women with one previous cesarean section who opted for TOLAC and delivered at the selected hospitals from December 2021 to June 2022.

Variables	Current mode of delivery		COR(95% CI)	P-Value	AOR(95% CI)
	Vaginal (%)	C/S (%)			
Age of the women					
20-25	30(21%)	27(23.5%)	1	1	1.313(0.143,1.452)
26-30	78(54.5%)	60(52.2%)	0.279(0.077,1.014)	0.453	2.318(0.137,3.129)
31-35	21(14.7%)	25(21.7%)	0.180(0.045,0.712)	0.215	3.443(0.123,3.551)
>35	14(9.8%)	3(2.6%)	1.128(1.062, 1.423)	0.0215	2.751(2.142,3.443)**
Inter-Pregnancy Interval					
6-18months	10(7%)	11(9.6%)	1	1	
Greater than 18 months	133(93%)	104(90.4%)	0.711(0.291, 1.738)	0.45	
History of Successful VBAC					
Yes	23(16.1%)	12(10.4%)	1	1	1
No	120(83.9%)	103(89.6%)	1.645(.780,3.46)	0.15*	1.011(0.418,2.445)
Health Outcome of Previous C/D					
Alive	138(96.5%)	113(98.3%)	0.488(0.093,2.565)	0.397	
Dead	5(3.5%)	2(1.7%)	1	1	
Parity					
<3	125(87.4%)	108(93.9%)	0.45(0.181,1.18)	0.085*	0.485(0.161,1.467)
>3	18(12.6%)	7(6.1%)	1	1	1

Fetal Weight					
1.5-2.499kgm	5(3.5%)	6(5.2%)	1.428(1.062, 3.119)	0.417	
2.5-3.999Kgm	137(96.5%)	107(93%)	1.579(1.477,2.114)	0.325	
>=4Kgm	0(0%)	2(1.7%)	1	1	
Cervical Dilatation at admission					
0-4cm	102(71.3%)	109(94.8%)	1	1	1
4-10cm	41(28.7%)	6(5.2%)	1.3(1.356,3.336)	0.0001*	1.833(1.074,1.875)**
Co-Morbidity					
Yes	9(6.3%)	17(14.8%)	0.387(0.166,0905)	0.028*	0.684(.254, 1.844)
No	134(93.7%)	98(85.2%)	1	1	1
Membrane status at admission					
Intact	15(10.5%)	49(42.6%)	1	1	1
Ruptured	128(89.5)	69(57.4%)	0.158(0.082,0.302)	0.0001*	1.2(1.098,1.407)**

*- candidate variables to the multivariable model at $p < 0.05$

** - Factors associated with success of vaginal birth after one cesarean section

6. Discussion

In this study the level of success of vaginal birth after one cesarean section was (55.4%) 95% CI, [49.34, 61.46]. The factors associated with success of vaginal birth after one cesarean section were cervical dilation greater than 4 cm, ruptured membrane at admission and age above 35 years.

The success rate of VBAC in this study was 55.4% which is comparable to study done in democratic republic of Congo which is 57.6% among 231 subjects, higher than studies done in cross-sectional study was done in Mettu, Karl referral hospital using 194 subjects who have one cesarean section scar and the success rate was 24.7%(21,22). This study was relatively low as compared to a similar cross sectional study conducted in India where the level of success of vaginal birth after one cesarean section in the being 78% (18). The possible justification for the discrepancy might be due to the following reasons; low threshold for NRFHRP and absence of continuous fetal monitoring machine, absence of protocol for labor induction and augmentation in our country for one cesarean section scarred uterus, early labeling of true labor and not rupturing the membrane timely leading to prolonged labor, Skill of professionals who are deciding for cesarean section.

Likewise, the finding from this study is also lower in level of success of vaginal birth after one cesarean section as compared to a study conducted in Ethiopia where the level being 68.4% (8).

The factors associated with success of vaginal birth after one cesarean section in the present study were: cervical dilation greater than four centimeters, ruptured membrane during admission and age above 35 year. The finding from this study was inline as compared to a

study conducted in Addis Ababa Ethiopia where membrane status during admission was statistically significantly associated with VBAC(8). There was study done in three teaching hospitals in Addis Ababa using 204 subjects case control study and the factors associated with successful TOLAC were rupture of membrane at admission, cervical dilation of more than 3 centimeters which is similar with the current study result(14). There was also Another study done in India prospective cohort study in 280 subjects and one of the determining factor for success rate of TOLAC was cervical dilation and effacement(28). Women with previous VBAC and women who achieved a maximal cervical dilatation of ≥ 7 cm at the time of previous caesarean had significantly higher VBAC success rates [21] Also, the finding from this study was concordant with another study revealed the VBAC success rate for women with maternal age greater than 30 years was 64% and 52% for less than 30 years of age. A research done in Norway Bergen University the success rate of TOLAC were low in women with high maternal age which is unlike to our finding(29). There was also another study done in Philadelphia which was retrospective cohort study and increased maternal age is risk factor for failed TOLAC.(30)

7. CONCLUSION

This study revealed lower level of vaginal birth after one cesarean section. The factors associated with successful of vaginal birth after one cesarean section were ruptured membrane during admission, cervical dilatation of greater than 4cm at admission, and age group greater than 35. Current intrapartal factors play major role in the success of TOLAC. The commonest indication for the cesarean section was NRFHRP and followed by prolonged latent stage of labor.

8. Recommendation

- ✓ Membrane rupture should be considered in mothers who have well established labor to avoid prolonged labor.
- ✓ This topic should be studied with larger sample size and the factors for increased repeat cesarean section in mothers who opted for TOLAC should be studied in depth

Declaration

I, the undersigned declare that this thesis is my original work in partial fulfillment of the requirement for the postgraduate study in Ob-Gyn. I also declare that it has never been presented in this or any other university and that all resources and materials used in the thesis have been duly acknowledged.

Resident's Name: Dr. Haimanot Kifle Telila

Signature: _____

Date of submission:

This thesis has been submitted for examination with my approval as an advisor.

Advisor Name: Dr. Hassen Hussein

Signature: _____

Date of submission:

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