

# ASSESSMENT OF FACTORS ASSOCIATED WITH THE SUCCESS RATE OF VAGINAL DELIVERY AFTER CESAREAN SECTION AT MATERNITY TEACHING HOSPITAL ERBIL –IRAQ

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## Abstract

**Introduction:** Worldwide, the prevalence of cesarean deliveries has substantially increased. Most women who have had one Prior lower segment caesarean section are suitable for vaginal birth after caesarean section. Trial of labor after cesarean section is an effort to reduce the number of cesarean section rates. However, there are few studies on vaginal birth following cesarean section in Iraq. **Aim of the study:** To identify the variables that affect the success rate of vaginal delivery after a cesarean section in Erbil City/Iraq. **Subjects and Methods:** From January 1 to July 1, 2023, a cross-sectional study was carried out at the Maternity Teaching Hospital in Erbil city / Iraq. After receiving informed consent from all participants , a convenient sample of 150 participant of pregnant women who had previously undergone a cesarean section and were currently undergoing trial of labor was included sociodemographic, past and present obstetric history including indication of previous cesarean section, previous vaginal delivery before or after cesarean section, birth space, labor characteristic information, admission of neonate to neonatal intensive care unit were all recorded, all obtained data was entered and examined by using the Statistical Package for Social Sciences (SPSS, version 26). **Results:** Success rate of vaginal birth in one hundred fifty women with a previous cesarean section was seventy three (73.3%), their mean (SD) age was  $29.1 \pm (6.1)$  years, There were a significant association between successful vaginal birth after cesarean section with higher parity, birth space more than 2 year, previous vaginal delivery, previous history of vaginal delivery after caesarian section, regular antenatal care follow up, cervical dilatation more than 4cm on admission, unruptured membrane on admission, absence of comorbid medical illness, gestational age less than forty weeks, body mass index on admission less than thirty. **Conclusion:** The results of this study showed a high success rate for vaginal delivery following a prior cesarean section, which is substantially correlated with many historical and present obstetrical characteristics, antepartum and intrapartum eve.

## INTRODUCTION

Trial of labor after cesarean section (TOLAC) is defined as an attempt to deliver vaginally by a woman who has had a previous cesarean section; if vaginal delivery is accomplished during the trial of labor, it is considered a vaginal birth after a cesarean section (VBAC).<sup>1</sup> Cesarean birth rates have risen drastically over the world. Cesarean section (CS) rates in the United States grew from 5% of all deliveries in 1970 to 31.9% in 2016.<sup>2</sup> With the increasing trends in the CS rates, a significant proportion of women with CS is being confronted with various problems in their upcoming pregnancies, particularly in their mode of delivery, despite efforts to lower the number of CS, it did not reach 15% target set rate which suggested by world health organization (WHO).<sup>3</sup>

The most significant element contributing to overall higher CS rates is a repeat cesarean section (RCS), a past CS is the key indicator of a repeat CS, and TOLAC is an attempt to lower CS rates. Several national medical societies have issued practice guidelines for VBAC,<sup>4,5</sup> but they vary by country,<sup>6</sup> When compared to a repeat CS, VBAC is generally considered safe,<sup>7</sup> TOLAC rates have, however, decreased dramatically globally in recent years,<sup>8,9</sup> With subsequent pregnancies, women with a

previous cesarean delivery confront a dilemma regarding the mode of delivery either vaginal birth after cesarean or repeat cesarean delivery.<sup>10,11</sup> VBAC is the preferred method for women with a singleton pregnancy of cephalic presentation at 37+0 weeks or more, with or without a previous vaginal birth. It is a safe and appropriate mode of delivery for the majority of expectant women with a single previous lower uterine transverse caesarean section, provided that they deliver at a facility with well-trained personnel and adequate operation resources. It is essential to inform women who have had a previous cesarean section about the risks and benefits of VBAC versus elective recurrent cesarean section.<sup>12</sup>

A trial of labor is often the last chance for a woman who has had a previous cesarean delivery to have a normal birth. A failed VBAC, on the other hand, raises the risk of maternal and neonatal problems more than a repeated elective CS.<sup>8,13</sup> A more careful selection of patients for TOLAC could be a potential answer to VBAC problems, early discussion to address women's chances of VBAC success and attitudes about future births could be beneficial during antenatal care. The likelihood of a successful vaginal birth is one of the most important variables in these women's decision-making during prenatal counseling.<sup>14</sup>

Two previous meta-analyses were published in 1990 (Rosen et al.) and in 2010 (Eden et al.). Rosen et al. focused on the indicators in the previous cesarean for VBAC success,<sup>15</sup> Eden et al. focused on studies about predictors of VBAC, which were conducted in developed countries.<sup>16</sup> They found that previous breech, previous vaginal delivery, Hispanic ethnicity, age of mother, duration of labor and extent of cervical dilatation affected the likelihood of VBAC.<sup>15,16</sup>

Multiple observational studies have assessed the likelihood that a woman who has undergone a trial of labor after cesarean will have a vaginal birth, with probabilities ranging from 60% to 80% for a successful VBAC. Individual patient probabilities for success may vary based on specific demographic characteristics and obstetric history, as well as antepartum and intrapartum events.<sup>3,17</sup> VBAC is associated with a shortened hospital stay, less blood loss, fewer infections, fewer transfusions, and fewer thromboembolic events than cesarean delivery.<sup>3,18,19</sup>

Cesarean section rate increased significantly over all the world. Rate of cesarean section is much higher than the optimal range suggested by world health organization, finding appropriate strategies for decreasing the rate is essential. Vaginal birth after cesarean section is an important strategy to limit overall all cesarean section rate which related to maternal morbidity intrapartum and postpartum complications. The primary aim of this study is to determine factors associate with success rate of vaginal delivery after a cesarean section in the Maternity teaching hospital-Erbil-Kurdistan region/Iraq.

## **METHODS**

### **Study design**

A prospective cross-sectional study.

### **Study setting and duration**

The current study was carried out at Maternity Teaching Hospital in Erbil, Iraq, from 1<sup>st</sup> of January to the 1<sup>st</sup> of July 2023.

### **Study subject:**

All pregnant women who had previous one caesarean section undergoing a trial of labor, were eligible to be included, in labor room no specific race.

### **Study sample and sample size**

A convenient sampling method was used to recruit data from pregnant ladies who have had one previous Cesarean section and undergoing trial of labor attending the Maternity Teaching Hospital in Erbil, Iraq. The target sample size was 150 participants.

### **Inclusion criteria**

- 1) Pregnant ladies with a history of one cesarean section
- 2) A singleton term pregnancy (ranging from 37 week to 42 weeks gestation)
- 3) Longitudinal lie, cephalic presentation, normal placentation,
- 4) Presented for spontaneous vaginal delivery in their current pregnancy.

### **Exclusion criteria**

- 1) Pregnant women with an obstetrical history of more than one cesarean sections.
- 2) Preterm pregnancies (<37 weeks gestation)
- 3) Pregnant women who have contraindications for a normal vaginal delivery, such as placenta Previa, classical cesarean section, history of uterine rupture, and multiple gestations.

### **Ethical consideration**

This study was approved by the research ethics committee of the executive office of the Arab board of Health specializations and a formal consent letter from the Erbil directorate of health was obtained before the initiation of the research. All pregnant ladies recruited for this study were informed about the nature and scope of the study and verbal consent was obtained from each of them before participation and before filling up the questionnaire. Each patient were assured regarding the privacy and confidentiality of the collected data.

## **DATA COLLECTION TOOLS**

### **Interviews**

Patient data was collected via face-to-face interviews. Candidate used Arabic, and Kurdish languages during the interviews. The aim and objectives of the study was explained to each patient in the language they were most comfortable with to avoid misunderstandings. The answers were documented in the questionnaire forms (face to face). The participant's identity was kept anonymous instead an ID code was used.

### **Questionnaire**

For the purpose of this study a questionnaire was designed by candidate and thoroughly reviewed by the supervisor to include all the relevant data required for this study, the questionnaire consisted of three parts (Appendix I):

In the first part demographic characteristics of the patients were collected such as age, residency, educational level, occupation, socioeconomic status of the family and body mass index (normal, overweight, obese)

In the second part, obstetrical history of the current and past pregnancies was addressed, in which parity, gestational age of the current pregnancy was recorded followed by, inter-delivery interval, indication of previous CS, history previous vaginal deliveries, and history of previous successful vaginal births after CS.

In the third part, information regarding the current labor were collected, this includes cervical dilation at presentation done by permanent of obstetrics and gynecology, status of membrane at presentation, duration of the labor, mode of current delivery, birth weight of the baby, and lastly neonatal outcome (done by permanent of pediatrics).

### Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 26). CHI square test of association was used to compare proportions of two or more groups. Fisher's exact test was used when the expected frequency (value) was less than 5 of more than 20% of the cells of the table. p value of  $\leq 0.05$  was considered as statistically significant.

## RESULTS

One hundred-fifty women with a history of one Cesarean section (CS) were included in the study. Their mean (SD) age was 29.1 (6.1) years, the median was 29 years, and the age range was 18-45 years. More than half (53.3%) of the women were aged 25-34 years, as presented in Table 1, which shows also that two thirds (66.7%) of the women were living in rural areas. Around one third of the women were either illiterate (16.7%) or can just read and write (13.3%), and the majority (96%) of them were housewives. More than half (60%) of the women had an insufficient income to cover the daily needs, and 56.7% of them were over-weight (Table 1).

**Table 1: Basic characteristics of the women**

	No.	(%)
Age		
< 25	36	(24.0)
25-34	80	(53.3)
$\geq 35$	34	(22.7)
Residency		
Inside Erbil city	50	(33.3)
Outside Erbil city	100	(66.7)
Educational level		
Illiterate	25	(16.7)
Read and write	20	(13.3)
Primary	34	(22.7)
Intermediate	26	(17.3)
Secondary	35	(23.3)
High education	10	(6.7)
Occupation		
Student	1	(0.7)
Private job	2	(1.3)
Governmental	3	(2.0)
Housewife	144	(96.0)
Family income		
Enough for daily needs	58	(38.7)
Not enough	90	(60.0)
Exceeds daily needs	2	(1.3)

Body mass index		
18.5-24	38	(25.3)
25-29	85	(56.7)
≥ 30	27	(18.0)
Total	150	(100.0)

The majority (76%) of the women were in their 37-39 weeks of gestation, and the largest proportion (45.3%) of them had one child. The inter-delivery interval was less than two years in only 16% of the women, and it was 2-5 years in 63.3% of the women. Regarding the indications for the previous CS, breech presentation was at the top of the list (24.7%), then failure of progress of labor (18%), fetal distress (13.3%), and ante-partum hemorrhage (12.7%), in addition to the other indications mentioned in the table. More than half (56%) of the women had history of previous vaginal delivery, and 34% had previous history of successful vaginal birth after CS (Table 2).

**Table 2: Obstetric history**

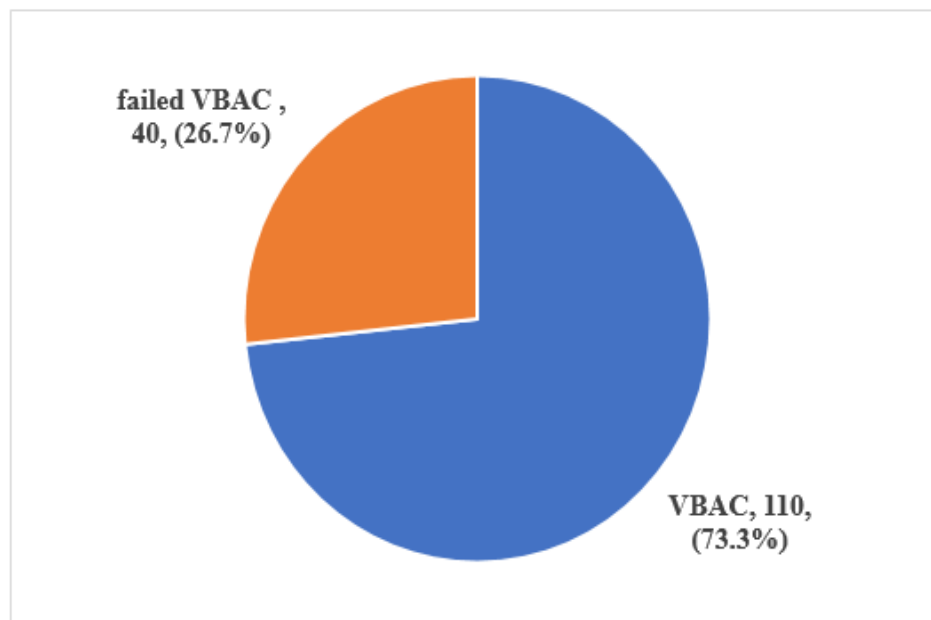
	No.	(%)
Gestational age (weeks)		
37-39	114	(76.0)
40-41	34	(22.7)
42	2	(1.3)
Parity		
I	68	(45.3)
II	27	(18.0)
≥ III	55	(36.7)
Inter-delivery interval (years)		
< 2	24	(16.0)
2-5	95	(63.3)
> 5	31	(20.7)
Indication of previous CS		
Breech	37	(24.7)
Failure of progress of labor	27	(18.0)
Fetal distress	20	(13.3)
Ante-partum hemorrhage	19	(12.7)
Amniotic fluid abnormality	14	(9.3)
Unknown	14	(9.3)
Patient wish	8	(5.3)
Macrosomia	6	(4.0)
Maternal disease	2	(1.3)
PROM	1	(0.7)
Multiple pregnancy	1	(0.7)
Meconium-stained liquor	1	(0.7)
Previous vaginal delivery		
Yes	84	(56.0)
No	66	(44.0)
Previous history of successful vaginal birth after CS		
Yes	51	(34.0)
No	99	(66.0)
Total	150	(100.0)

It is evident in Table 3 that the cervical dilatation was ≥ 4 cm in 70.7% of the women, and the membrane was ruptured in 35.3% of the women. The duration of labor was less than eight hours among the majority (96%) of the women, and only one neonate (0.7%) had a low birth weight of less than 2.5 Kg (Table 3).

**Table 3: Labor characteristics**

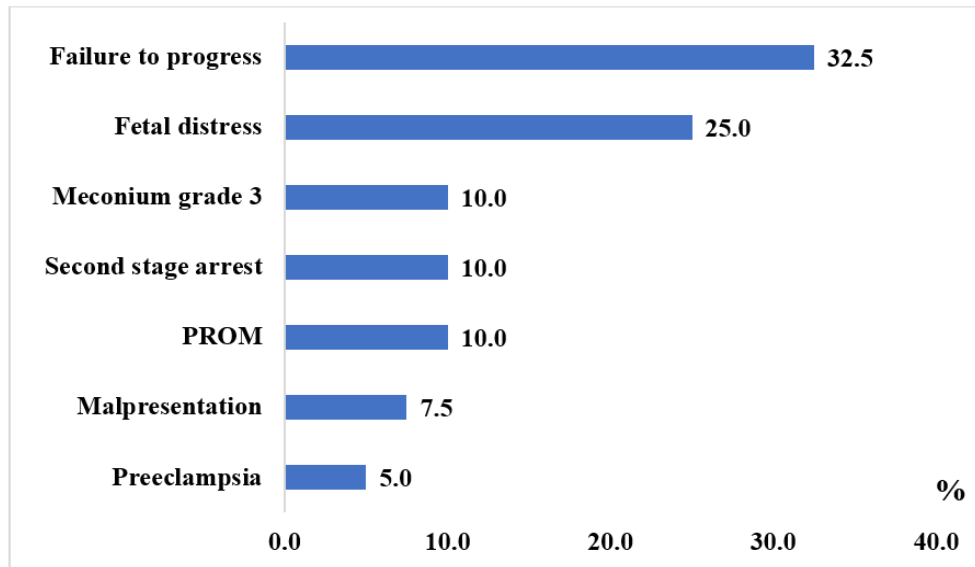
	No.	(%)
Cervical dilatation (cm)		
< 4	44	(29.3)
≥ 4	106	(70.7)
Status of membrane on admission		
Ruptured	53	(35.3)
Not ruptured	97	(64.7)
Duration of labor (hours)		
< 8 hours	144	(96.0)
≥ 8 hours	6	(4.0)
Birth weight (Kg)		
< 2.5	1	(0.7)
2.5-3.9	108	(72.0)
≥ 4	41	(27.3)
Total	150	(100.0)

Regarding the current mode of delivery, it was by vaginal delivery in 73.3% of the women (Figure 1).



**Figure 1: Current mode of delivery**

Forty women (26.7%) delivered by CS, and the main indications for it were: Failure to progress (32.5%), fetal distress (25%), then meconium grade 3, second stage arrest, and premature rupture of membrane (10% for each), in addition to the other cause mentioned in Figure 2.



**Figure 2: Indication for emergency CS (failed VBAC) (n = 40)**

Significant ( $p < 0.001$ ) association was detected between the mode of delivery (MoD) and the body mass index (BMI), where it is evident in Table 4 that the least rate of vaginal delivery (VBAC) (37%) was among obese women ( $BMI \geq 30 \text{ Kg/m}^2$ ), compared with 84.2% and 80% among women with normal BMI, and over-weight women respectively (Table 4).

**Table 4: Mode of delivery by body mass index**

Body mass index ( $\text{Kg/m}^2$ )	N	Successful VBAC	Failed VBAC	P*
		No. (%)	No. (%)	
< 25	38	32 (84.2)	6 (15.8)	
25-29	85	68 (80.0)	17 (20.0)	
$\geq 30$	27	10 (37.0)	17 (63.0)	< 0.001
Total	150	110 (73.3)	40 (26.7)	

\*By Chi square test.

The least rate of VBAC (63.2%) was among para 1 women, which was significantly less than the rates of the other women ( $p = 0.034$ ). Regarding the inter-delivery interval, the least rate of VBAC (41.7%) was among women with less than two years of inter-delivery interval which was significantly less than the rates of other categories ( $p < 0.001$ ).

Previous vaginal delivery was significantly ( $p = 0.006$ ) associated with high rate of VBAC, also the previous history of successful vaginal birth after CS was significantly associated with high rate of VBAC, which was 92.2% among those with the mentioned history, compared with 63.6% among those with no such a history ( $p < 0.001$ ).

The rate of VBAC among those with history of regular ANC visits (87.4%) was significantly ( $p < 0.001$ ) higher than the rate among those with irregular ANC visits (49.1%) as presented in Table 5.



**Table 5: Mode of delivery by obstetric history**

	N	Mode of delivery		P*
		Successful VBAC No. (%)	Failed VBAC No. (%)	
<b>Parity</b>				
I	68	43 (63.2)	25 (36.8)	
II	27	23 (85.2)	4 (14.8)	
≥ III	55	44 (80.0)	11 (20.0)	0.034
<b>Inter-delivery interval (years)</b>				
< 2	24	10 (41.7)	14 (58.3)	
2-5	95	77 (81.1)	18 (18.9)	
> 5	31	23 (74.2)	8 (25.8)	< 0.001
<b>Previous vaginal delivery</b>				
Yes	84	69 (82.1)	15 (17.9)	
No	66	41 (62.1)	25 (37.9)	0.006
<b>Previous history of successful vaginal birth after CS</b>				
Yes	51	47 (92.2)	4 (7.8)	
No	99	63 (63.6)	36 (36.4)	< 0.001 **
<b>ANC</b>				
Regular	95	83 (87.4)	12 (12.6)	
Irregular	55	27 (49.1)	28 (50.9)	< 0.001
Total	150	110 (73.3)	40 (26.7)	

\*By Chi square test \*\* Fisher exact test

It is evident in Table 6 that the factors that were significantly associated with higher rates of VBAC were: cervical dilatation ( $p < 0.001$ ), and unruptured membrane on admission ( $p = 0.023$ ), but no significant ( $p = 0.193$ ) association was detected with the duration of labor (Table 6).

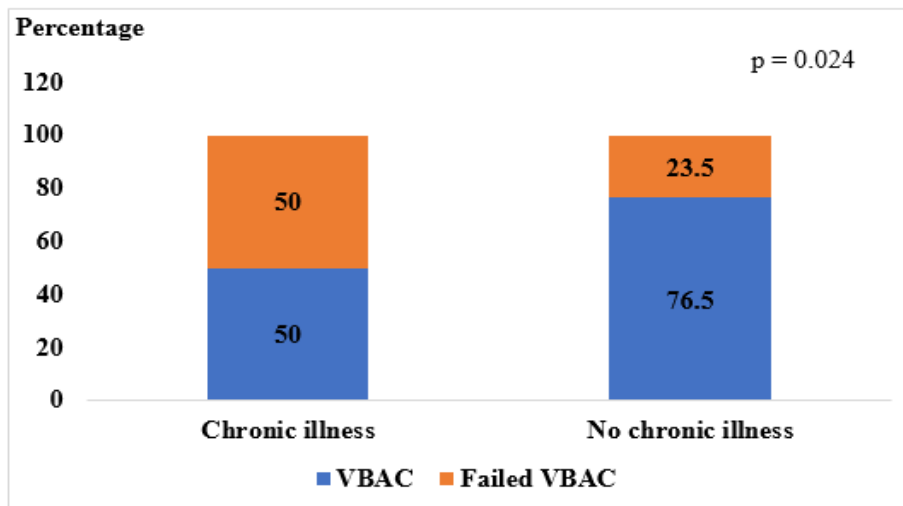
**Table 6: Mode of delivery by labor characteristics**

	N	Mode of delivery		P
		Successful VBAC No. (%)	Failed VBAC No. (%)	
<b>Cervical dilatation</b>				
< 4	44	12 (27.3)	32 (72.7)	
≥ 4	106	98 (92.5)	8 (7.5)	< 0.001*
<b>Status of membrane on admission</b>				
Ruptured	53	33 (62.3)	20 (37.7)	
Not ruptured	97	77 (79.4)	20 (20.6)	0.023*
<b>Duration of labor (hours)</b>				
< 8	144	107 (74.3)	37 (25.7)	
≥ 8	6	3 (50.0)	3 (50.0)	0.193**
Total	150	110 (73.3)	40 (26.7)	

\*By Chi square test. \*\*By Fisher's exact test.

It is evident in Figure 3 that 50% of those with comorbid medical illness delivered vaginally, compared with 76.5% of those with no chronic illness ( $p = 0.024$ ). It is worth to mention that 17 of those with chronic illness had hypertension and only one patient had hypothyroidism





**Figure 3: Mode of delivery by presence of comorbid medical illness**

No significant association was detected between the birth weight and MoD ( $p = 0.330$ ). The rate of VBAC among women with gestational age of 37-39 weeks (80.7%) was significantly ( $p = 0.001$ ) higher the rates among those with  $\geq 40$  weeks gestation (50%) as presented in Table 7.

**Table 7: Mode of delivery by birth weight and gestational age**

	N	Mode of delivery		P*
		Successful VBAC No. (%)	Failed VBAC No. (%)	
<b>Birth weight (Kg)</b>				
< 2.5	1	0 (0.0)	1 (100.0)	
2.5-3.9	108	79 (73.1)	29 (26.9)	
$\geq 4$	41	31 (75.6)	10 (24.4)	0.330
<b>Gestational age (weeks)</b>				
37-39	114	92 (80.7)	22 (19.3)	
40-41	34	17 (50.0)	17 (50.0)	
42	2	1 (50.0)	1 (50.0)	0.001
Total	150	110 (73.3)	40 (26.7)	

\*By Fisher's exact test.

The rate of low APGAR score among neonates delivered by CS (TOLAC) was 50%, which was significantly ( $p < 0.001$ ) higher than the rate among neonates delivered vaginally (15.5%). Also, the rate of NICU admission was significantly ( $p = 0.009$ ) higher among those delivered by CS than among those delivered vaginally (32.5% and 13.6% respectively (Table 8).

**Table 8: Neonatal outcomes by mode of delivery**

	Successful VBAC No. (%)	Failed VBAC No. (%)	Total No. (%)	P*
<b>Low APGAR score</b>				
Yes	17 (15.5)	20 (50.0)	37 (24.7)	
No	93 (84.5)	20 (50.0)	113 (75.3)	< 0.001
<b>NICU admission</b>				
Yes	15 (13.6)	13 (32.5)	28 (18.7)	
No	95 (86.4)	27 (67.5)	122 (81.3)	0.009
Total	110 (100.0)	40 (100.0)	150 (100.0)	

\*By Chi square test.

## DISCUSSION

VBAC has been strongly accepted, resulting in a significant increase in attempted and successful vaginal births and a declining in overall cesarean section rate. The practice of vaginal delivery after a previous cesarean section is spreading throughout all obstetrical facilities worldwide, with a success rate of 60–80%.<sup>3,20</sup>

The success rate of vaginal delivery in the current study population was (73.3%), which was close to a study conducted in Egypt which revealed that (72%) success rate.<sup>21</sup> While the result of current study significantly higher than studies conducted in Ethiopia (45.5%), Bahrain (41%), Nigeria (50%) and Thailand (51.5%) respectively.<sup>22,23, 24,25</sup> But at the same time result was lower than a study conducted in Taiwan (84.9%), China (82%), India (85%).<sup>26,27,28</sup> This difference may be due to different hospital protocols and facilities, as well as the economic and cultural discrepancy of the study participants might be account for this disparity on success of VBAC rate. The other possible explanation might be the difference between the ways of trial of VBAC which can impose a great difference on the success rate. In developed countries they mean by VBAC which is successful vaginal delivery by a woman with previous cesarean scar either spontaneously, induction/augmentation, or instrumental delivery.<sup>26,27,28</sup> However in Iraq and the study area VBAC is defined as woman who had previous cesarean scar delivered vaginally spontaneously, without any intervention like Induction/augmentation, instrumental delivery like vacuum and forceps were contraindicated and not practiced for a woman with previous cesarean scar as one of the hospital policies in Maternity Hospital, Additionally, another cause could be the use of epidural analgesia to lessen pain during labor. Even for normal labor, the majority of developed countries employ epidural analgesia for women who try to go into labor following a cesarean section. However, in present study area they did not employ epidural analgesia for women who are undergoing trial of labor to relieve labor discomfort. This information is supported up by numerous academic studies that demonstrate how effective epidural anesthesia is for TOLAC, how successful it is for VBAC, and how providing women with enough pain relief can influence their decision to try labor.<sup>29</sup>

Among the women with previous cesarean, in the current study, the largest portion of women were in the age range 25-34 years of age (53.3%). This is in accordance with a study conducted in Nigeria (52%), Egypt (50%) in which they recorded the highest prevalence in the same age group.<sup>21,30</sup> In another study which done in Ethiopia revealed that 59% in this age range.<sup>31</sup> While study done in Brazil the maximum number was in the age range 25-29 (41.3%),<sup>32</sup> Respectively. This corresponds to the age of reproduction and peak sexual activity, and high fertility rate within these age groups. Regarding residency and occupation in the current study showed that two thirds (66.7%) of the women were living in rural areas, findings of this study parallel with a study done in Turkey were majority from rural residency.<sup>33</sup> This result disagree with the result of a study done in Ethiopia which revealed more than half of participants were from outside city (64%) respectively.<sup>22</sup> regarding Occupation in present study majority of them (96%) were house wife this is disagreed with study done in Nigeria which revealed that only 10% of them were housewife.<sup>24</sup> In the current study rate of successful vaginal delivery after C-section increased with increase in number of parity; among para 1 women was it significantly lower (63.2%) than the rate of para 2 (85%) and 3 or more women. This is in accordance with 2 studies conducted in Ethiopia in which the success rate of vaginal delivery after C-section among para 1 women was

21.4% compared to 30.9% and 47.8% in para 2 and para 3 or more respectively.<sup>31,35</sup> which is possible reason that multiparous women would experience more effective uterine contractions during labor. In this study, history of previous vaginal birth was significantly associated with success rate of VBAC (82.1%). This is higher than the result of previous studies. For example, in Ethiopia reported that the 55% success rate of VBAC among women with history of previous vaginal delivery at any point.<sup>67</sup> Moreover, in a study conducted in China, the highest rate of VBAC (96.4%) was among women who had history of previous vaginal delivery.<sup>27</sup> The result supported by the studies mentioned in Turkey, Italy, India, and Addis Ababa.<sup>33,35,36,37</sup> The possible explanation may be due to that they have more suitable pelvic cavity for vaginal delivery, which will lead to a reduction in subsequent difficulties.<sup>38,39,40, 41</sup>

Results in the present study showed that previous history of successful VBAC was significantly associated with the successful VBAC (92.2%). This result is consistent with study findings done in Ethiopia in which they reported 68.3% success rate of VBAC in among women with a history of previous VBAC.<sup>34</sup> In a large Meta-analysis study conducted by Wu et al, in which 94 studies were analyzed, amounting to a total 239006 women who attempted VBAC were included in this study they reported that history of successful VBAC increased the likelihood of current VBAC by approximately 5 times compared to those who haven't had a successful VBAC prior to the presenting pregnancy.<sup>42</sup> Coleman et al. also reported that the strongest predictor of a successful VBAC is prior successful VBAC. They also reported that the prior successful VBAC is protective factor against uterine rupture.<sup>43</sup>

The percentage of cervical dilation >4 cm on admission in the present studied cases was significantly higher in patients who have a successful VBAC ( 70%) in comparison to those who had failed VBAC , This finding is consistent with two other studies conducted in Egypt and Ethiopia in which they reported that women with a cervical dilation more than 4 at presentation were more likely to have a successful VBAC .Present result finding in accordance with Durnwald et al.'s study in which they reported that cervical dilation on admission was significantly higher in the successful VBAC group compared to failed VBAC.<sup>44</sup> Women with cervical dilatation  $\geq 4$ cm at presentation are twice as likely to have successful VBAC and cervical dilatation during the active initial stage of labor increased the success of VBAC.<sup>45,46</sup> The reasoning behind this possibility is that mothers might be advancing to full dilatation significantly more quickly while they are in the active stage of labor.<sup>47,48</sup> Evidence suggested that the initial cervical dilatation  $\geq 4$ cm at the time of admission had a significant impact on the success of the trial of labor following a caesarean birth.<sup>49,50</sup>

Another factor that was significantly associated with a successful VBAC is the inter-delivery interval between the previous C-section and the current pregnancy. The result in current study found that success rate among women with an inter-delivery interval of less than 2 years was significantly lower (41.7%) than women with longer inter-delivery intervals (81.1%). This finding is consistent with Abdelazim et al.'s study in which only 22.7% of women with an inter-delivery interval of less than 2 years had a successful VBAC.<sup>34</sup> while a study done in the Netherlands reported that an inter-delivery period of <2 year was not associated with the decreased success of vaginal birth after cesarean.<sup>51</sup> The results of this study show significant negative association between BMI and successful VBAC a higher rate of success of VBAC was reported among pregnant women with lower BMI (84.2%) compared to pregnant women with higher BMI  $\geq 30$  (37%) This finding parallel with studies done in Ethiopia, Cleveland

where they reported BMI  $\geq 30$  was associated with a higher rate of unsuccessful VBAC (58.8% ,68.4%) compared to non-obese women (70%, 76.9%,) respectively.<sup>29,34</sup> Furthermore, Juhasz et al. concluded that increasing BMI decreases the chance of successful VBAC.<sup>52</sup> The best explanation for these findings may be due to the fact that obese women are at an increased risk of comorbid medical illness including preeclampsia, gestational hypertension, macrosomia and even difficult labor. Antenatal care was also a significant factor associated with a successful VBAC in present study result, a higher percentage of women who have had regular antenatal care proceeded to have a successful VBAC (87%) compared to women who haven't had proper antenatal care (49.1%). Rizzo et al, in Italy concluded that antepartum prediction of VBAC is possible by using ultrasound for measuring fetal head circumference, subpubic angle and cervical length, scar thickness.<sup>53</sup> Therefore, it is important for women to be encouraged to seek regular antenatal care prior to planning TOLAC.

In the present study also found that there is a significant correlation between absence of co morbid medical illness and successful VBAC. Fifty-percent of cases who had comorbid illnesses had a failed VBAC compared to only 23.5% percentage of failure among those without diseases. This is similar to Wu et al's met analysis findings where they reported that both pre-existing diabetes and gestational diabetes, chronic or gestational hypertension were considered significant risk factors for failed VBAC.<sup>42</sup> Numerous studies have shown that chronic illness especially diabetes mellitus reduces the chance of a successful vaginal delivery in both women with and without previous scars attempting trial of labor. However, reported success rates encourage trial of labor in women with diabetes.<sup>54,55,56,57</sup> Another significant factor associated with a successful VBAC was the gestational age of the fetus. In current study found that the percentage of successful VBAC among those at 37-39 weeks gestation was significantly higher (80%) than those with gestational age  $\geq 40$  weeks (50%) which was parallel to the result of Smith et al. reported a similar finding where they concluded TOLAC was likely to be unsuccessful at 41 weeks or 42 weeks gestation compared to 40 weeks.<sup>58</sup> Coassolo et al in Pennsylvania also reported the same that the failure rate less than 40 weeks gestation was 31.3%, against 22% failure rate among those at > 40 weeks.<sup>59</sup>

The most common indication for emergency C-section in the present result study was a failure to progress followed by fetal distress and second stage arrest (32%)(25%)(10%) and The most common indication for a primary CS was breech presentation (24%) ,this finding is similar to the result of the study done in Ethiopia were a common indication for emergency CS were failed to progress followed by non-reassuring fetal heart rate at the same time common indication for previous CS were malpresentation.<sup>34</sup> Some studies show that indications that have a low rate of recurrence have a higher rate of successful VBAC.<sup>34,60</sup> While Tanchuco et al. reported that indication of a previous C-section was not a significant factor affecting VBAC but that it is important to be discussed in counseling patients who are considering TOLAC. In their study the most common indication was malpresentation (66.5%).<sup>61</sup> It is also significant to note that the current studies finding are consistent with those of three other studies, which found that the rate of NCU admission was significantly higher in in unsuccessful VBAC group compare to successful VBAC group in terms of low Apgar score and NCU admission (50%, 67%).<sup>34,62,63</sup>

## LIMITATIONS OF THE STUDY

The setting of the study includes only a governmental hospital in Erbil city; the Maternity Teaching hospital and does not include other private hospital

## CONCLUSION

- 1) TOLAC is considered a safe and often successful in well evaluated and carefully selected cases.
- 2) The success rate in the current study was high which in line to standard rate.
- 3) Two third of women were aged (25-34) years, majority were housewife, and more than two thirds were from rural residency
- 4) High parity, inter-delivery interval more than 2 years, previous vaginal delivery, previous history of vaginal delivery after caesarian section, regular ANC follow up, cervical dilatation more than 4cm, absence of comorbid medical illness, gestational age < 40 weeks, BMI on admission < 30 all were factors significantly associate with successful VBAC.
- 5) No statistically significant association was found between duration of labor, birth weight of baby with mode of delivery.
- 6) The rate of low Apgar score and NICU admission were significantly higher among neonates who were delivered by emergency caesarian section than among those who were delivered vaginally.

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