

**OUTCOME OF LABOUR OF UNTESTED CAESAREAN SCAR AND
FACTORS AFFECTING ITS OUTCOME IN
SABAH WOMEN AND CHILD HEALTH HOSPITAL**

by

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Manuscript Submitted in
Partial Fulfillment of The Requirements for The
Degree of Master of Medicine (Obstetric and Gynaecology)

UNIVERSITI SAINS MALAYSIA

2020

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ACKNOWLEDGEMENT

This thesis was able to be written with the kind support and assistance from many individuals which I would like to extend my sincere thanks to all of them.

Foremost, I would like to express my special gratitude and thanks to my main supervisor Associate Professor Dr Mohd Pazudin Ismail, Head of Department of Obstetric and Gynaecology, Hospital Universiti Sains Malaysia (HUSM), for his supervision and constant guidance. His constant suggestion and constructive comments during the research duration have enlighten me on successfully complete in production of this Thesis. I would also like to take this opportunity to express my sincere thanks to my co-supervisor Datuk Dr Soon Ruey, Head of Department of Obstetric and Gynaecology of Hospital Wanita dan Kanak-Kanak Sabah (HWKKS), for the guidance during research field work and research writing in the Hospital.

Not to forget, I would also like to express my gratitude to staff of Unit Record for assisting me in tracing the case files and allowing me to review the files in their department. Their presence has contributed significantly towards the success of data collection for this study.

I would take this opportunity to express my gratitude also to all the faculty members of Department of Obstetric and Gynaecology HUSM for their help and encouragement. I also would like to thank my family for their persistent support, prayers and encouragement during the process. Last but not least, I would like to thank those who indirectly contributed to this research not mentioned here. Thank You.

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LIST OF ABBREVIATIONS

ACOG	American College Of Obstetric And Gynaecology
BMI	Body Mass Index
CS	Caesarean Section
EBL	Estimated Blood Loss
ERCS	Elective Repeated Caesarean Section
HWKKS	Hospital Wanita Dan Kanak Kanak Sabah
IOL	Induction Of Labour
IPI	Inter-pregnancy Interval
JPEM	The Human Research Ethics Committee Of USM
MOH	Ministry Of Health, Malaysia
NICE	The National Institute For Health And Care Excellence
NIH	National Institute Of Health
OASIS	Obstetric Anal Sphincter Injury
PPH	Post-partum Hemorrhage
SEA	South East Asia
SPSS	Statistical Products And Service Solutions
VBAC	Vaginal Birth After Caesarean Section

FAKTOR YANG MEMPENGARUHI PROSES BERSALIN DI KALANGAN PESAKIT
SELEPAS PEMBEDAHAN CAESAREAN DI HOSPITAL WANITA DAN KANAK
KANAK SABAH

ABSTRAK

Pengenalan: Peratusan pembedahan bersalin semakin meningkat di seluruh dunia. Ini menyebabkan peratusan pesakit yang bakal melalui proses mengandung dan bersalin dengan parut caesarean semakin meningkat. Pemilihan pesakit secara tepat adalah penting bagi mengurangkan risiko berkaitan dengan process bersalin dengan parut caesarean terdahulu. Berdasarkan kajian sebelum, hanya pesakit yang telah melalui process bersalin selepas caesarean terdahulu mempunyai peratusan berjaya yang lebih tinggi. Justeru, kajian ini bertujuan untuk menyelidik factor-factor lain yang berpotensi untuk mempengaruhi hasil cubaan process bersalin biasa selepas caesarean terdahulu.

Metodologi: Sebuah kajian retrospectif telah dijalankan di Hospital Wanita dan Kanak Kanak Sabah dengan memeriksa record perubatan pesakit yang melalui proses bersalin secara normal selepas pembedahan caesarean terdahulu yang tidak pernah diuji. Data-data yang dikumpulkan termasuk pengagihan socio-demografik, factor-faktor semasa mengandung dan semasa proses bersalin dan hasil proses cubaan bersalin secara normal. Keputusan tersebut akan dianalisa menggunakan program SPSS.

Keputusan: Peratusan berjaya proses bersalin secara normal selepas caesarean adalah pada 66.8%. Faktor-faktor yang mempengaruhi proses tersebut adalah selang kelahiran melebihi 60 bulan (adjusted OR 2.128, 95% CI 1.343 – 3.373), obesiti (adjusted OR 1.457 1.303 – 1.629), tidak pernah melalui process bersalin melalui vaginal (adjusted OR 3.436, 95%CI 2.307 –

5.118), berat badan kandungan (adjusted OR 2.723, 95%CI 1.385 – 5.354), pencetusan kelahiran (adjusted OR 3.645, 95% CI 2.541 – 5.227) dan pembedahan terdahulu untuk indikasi ‘malpresentation’, placenta previa, ‘poor progress’, ‘prolong second stage of labour’ dan cord prolapse. Berikutan VBAC, risiko PPH adalah tidak signifikan secara statistik pada pesakit dengan VBAC yang tidak berjaya. Risiko OASIS meningkat dengan keperluan bersalin dengan peralatan forceps atau vaccum. Risiko ‘uterine dehiscence’ meningkat dengan selang waktu kehamilan yang pendek. Terdapat risiko sindrom asfiksia neonatal dan aspirasi mekonium yang rendah.

Kesimpulan: Saringan dan pemilihan pesakit yang sesuai adalah penting bagi mencegah morbiditi dan mortaliti kepada ibu dan kandungan. Pakar obstetrik perlu membimbing pesakit untuk memilih cara bersalin yang paling sesuai untuk mereka selepas mengkaji faktor risiko yang ada pada setiap individu.

OUTCOME OF LABOUR OF UNTESTED CAESAREAN SCAR AND FACTORS
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ABSTRACT

Objective: Caesarean section rate is on a rising trend worldwide resulting in increased pregnancies with previous caesarean scar. Proper patient selection for trial of labour after caesarean section is important as this improve success rate as well as reduce morbidity associated with labour. It is known that the single important predictor value is history of successful VBAC. Therefore, this study aims to evaluate the success rate of VBAC as well as to explore the factors affecting its success rate after excluding patient with history of successful VBAC.

Methods: A retrospective cohort study was conducted at Hospital Wanita dan Kanak Kanak Sabah (HWKKS) involving reviews of patients' record with one previous lower segment caesarean section which is untested and going for trial of labour in the hospital. The information obtained includes sociodemographic distribution, maternal non-modifiable and modifiable factors, antenatal and intrapartum factors and outcome of the delivery. The data were analysed using SPSS by multiple logistic regression.

Results: The success rate of untested VBAC was 66.8%. The significant factors affecting the success rate of VBAC include inter-delivery intervals more than 60 months (adjusted OR 2.128, 95% CI 1.343 – 3.373), maternal obesity (adjusted OR 1.457 1.303 – 1.629), absence of previous vaginal birth (adjusted OR 3.436, 95%CI 2.307 – 5.118), increasing estimated fetal weight (adjusted OR 2.723, 95%CI 1.385 – 5.354), induction of labour (adjusted OR 3.645, 95% CI 2.541 – 5.227) and previous caesarean section for the indication of

malpresentation, placenta previa, poor progress of labour, prolonged second stage of labour and cord prolapse. Following an unsuccessful VBAC, the risk of PPH is statistically insignificant. The OASIS risk increases with the need for instrumental delivery. The risk of uterine scar dehiscence increases with short inter-delivery interval. Their neonatal risk of neonatal asphyxia and meconium aspiration syndrome is considerably low.

Conclusions: Proper patient selection can reduce morbidity associated with trial of labour after caesarean section as well as avoid unnecessary morbidity associated with repeated caesarean section. Obstetrician should assist the patient in making a sound decision on her delivery plan.

CHAPTER 2: INTRODUCTION

2.1 Background of the Study

The caesarean delivery rate is on a rising trend both in developing and developed countries. In 1985, a consensus released by a panel of reproductive health experts expressed that the global expected rate of caesarean delivery was 10 to 15%⁽¹⁾. Since then, there was a steep increase in the rate of caesarean section across the globe. In a review by Niino, the caesarean delivery rate was as high as 43.9% in Mexico for the year 2007 with majority of developed countries had a caesarean delivery rate above 30%⁽²⁾. The caesarean delivery rate in the United Kingdom from 2012 to 2013 was at 25.5%⁽³⁾. Meanwhile, statistic obtained from the delivery summary of HWKKS for the year 2017 shows a caesarean section rate of 30.75%.

The rise in the caesarean delivery rate occurs due to several factors. Firstly, improvement in social-economic status results in more women requesting caesarean delivery although not medically indicated. This occurs more frequently in private services and developed countries. For instance, Niino reported that in the review of the study on the rate of caesarean section done in China by WHO, 11.6% of the caesarean section in the year 2017 was performed without any medical indication. Secondly, the evolution of medical practice towards defensive medicine to prevent litigation had resulted in increase number of delivery by caesarean section. Thirdly, advancement in medical technology used for labour also affects the incidence of caesarean deliveries. For instance, the use of epidural analgesia is associated with increased risk of emergency caesarean section⁽²⁾. With the increasing incidence of caesarean section, this affects the reproductive health of women⁽⁴⁾. There will be an increase in number of pregnancy with previous uterine scar.

Pregnancy with previous lower segment uterine scar is regarded as a high-risk pregnancy which needs thorough counselling on the mode of delivery during the antenatal visit. Patient often offered options of either vaginal birth after caesarean (VBAC) or elective repeated caesarean section (ERCS) after assessment of risk factor and exclude contraindications for VBAC. According to guidelines on Birth After Previous Caesarean Birth by Royal College of Obstetrician and Gynaecologist, there is a general consensus by National Institute for Health and Care Excellence (NICE), Royal College of Obstetricians and Gynaecologist (RCOG), American College of Obstetricians and Gynaecologist (ACOG) and National Institutes of Health (NIH) that trial of labour after caesarean section is considerably safe in the majority of patient with single lower segment uterine scar ⁽³⁾.

Successful trial of labour after caesarean section is associated with lower maternal morbidity and mortality such as shorter hospital stays and early ambulation, while unsuccessful trial of labour after caesarean section will result in need for an emergency caesarean section which carries higher morbidity and mortality risk compared to elective surgery. Therefore, clinical assessment and comprehensive counselling are important to assist the patient to decide on the most suitable mode for delivery in a patient with a single lower segment uterine scar. Local data, if available, provides important information during counselling of mode of delivery following previous caesarean section to assist patient to make a better decision on the choice of her delivery route.

2.2 Problem Statement and Rational of Study

According to guidelines on Birth After Previous Caesarean Birth (2015) by Royal College of Obstetrician and Gynaecologist (RCOG), the single best predictor for a successful vaginal birth after caesarean section is the previous history of a vaginal delivery particularly previous successful trial of labour after caesarean section⁽³⁾. There are also several other factors which may affect the outcome of the trial of labour after previous caesarean section. This includes maternal biophysical profile (ie. maternal height, maternal weight and maternal body mass index), maternal age, infant birth weight, type of labour (ie. spontaneous or induced) and the indication of previous caesarean section. Current available studies show that certain factors are statistically significant to predict a successful trial of labour after previous caesarean section but equivocal in other studies. This could be due to the presence of a single factor which is a previous successful trial of labour after caesarean section which significantly influence the outcome of the study.

Therefore, this study is chosen to further investigate the factors after excluding previous successful trial of labour after caesarean section from the study to allow better interpretation of the confounding factors. This study is chosen in Hospital Wanita Dan Kanak-Kanak Sabah (HWKKS) because the hospital handles an average of 15,000 deliveries per year with a significant number of patient is expected to undergo trial of labour after caesarean section either spontaneous or induced labour. As there is limited local data available on the outcome of trial of labour after caesarean section in O&G dept HWKKS, this study also helps to evaluate its success rate for the untested trial of labour after caesarean section and outcome for improvement of services as well as facilitate counselling of patient for the mode of delivery following previous caesarean section in HWKKS in near future.

2.3 Research Questions

1. What is the success rate of trial of labour after recent caesarean section?
2. What are the factors affecting the outcome of the trial of labour after recent caesarean section on the local population of Sabah?

2.4 General Objective

To study the outcome of pregnancy following trial of labour after recent caesarean section and factors affecting its outcome in Hospital Wanita & Kanak-Kanak Sabah (HWKKS).

2.5 Specific Objective

1. To determine the success rate of trial of labour after recent caesarean section in Hospital Wanita dan Kanak-Kanak Sabah (HWKKS)
2. To determine factors associated with the outcome of the trial of labour after caesarean section on the local population of Sabah
3. To study on complications following the trial of labour after recent caesarean section (ie. Uterine rupture, primary post-partum haemorrhage, retained placenta and extended perineal tear)

2.6 Hypotheses Statement

There are significant association between maternal and obstetrical factors to the outcome of the trial of labour after recent caesarean section in a patient with one previous caesarean section.

CHAPTER 3: LITERATURE REVIEW

3.1: Success rate of trial of labour after caesarean section

The success rate of vaginal birth after caesarean section (including both tested and untested) according to guidelines on Birth After Previous Caesarean Birth from Royal Collage of Obstetrician and Gynaecology is at 72 – 75%⁽³⁾. In Malaysia, the study done by Liza et al, on the obstetric outcome of patients with one previous caesarean section for the year 2010 in 14 state hospital shows vaginal delivery occur in 3448 of 6287 delivery (54.8%)⁽⁵⁾. However, this study did not explore specifically on the success rate of Vaginal Birth After Caesarean section as it includes the patient who opted for elective repeated caesarean section (n = 803) as well. For the patient who had an emergency delivery, it includes both obstetric and maternal indication (n = 2036). The number of patients undergoes successful vaginal birth after caesarean delivery was at 3448 but the number of patient undergone trial of labour after caesarean section was unknown. Moreover, there is also a possibility of a discrepancy of success rate in different tertiary centre in Malaysia as the threshold for caesarean section varies according to the tertiary center. In a report by Karalasingam, the caesarean section rate for the year 2010 across 14 tertiary hospitals across Malaysia varies from 15.8% to 32.2%⁽⁶⁾. The caesarean section rate for Hospital Wanita dan Kanak-Kanak Sabah (HWKKS) was at 30.75% for the year 2017.

3.2 Factors affecting outcome of trial of labour after caesarean section

According to RCOG, the single most important factor which predicts the likelihood of a successful vaginal birth after caesarean section is the previous history of a successful trial of labour after caesarean section. There are also several other factors which postulated to increase the likelihood of a successful trial of labour after caesarean section. However, the currently available evidence does not strongly support the prediction of successful vaginal birth after caesarean section as certain study are statistically significant in affecting the outcome of vaginal birth after caesarean section while other studies on the similar factors were equivocal. Factors postulated to promote successful vaginal birth after caesarean section includes maternal age less than 30 years old, body mass index (BMI) less than 30kg/m², previous caesarean indication for a non-emergency situation, spontaneous onset of labour, previous vaginal delivery, pregnancy interval more than 12 months after previous caesarean section and absence of medical indication for caesarean delivery. Whereas, the factors that reduce the likelihood of successful vaginal birth after caesarean section includes short maternal stature, post-date, induced labour, no previous vaginal birth, less than 12 months since previous caesarean section, previous caesarean section for emergency indication, fetal macrosomia and maternal obesity⁽⁴⁾.

3.2.1 Maternal Age

Several studies investigate the relationship between maternal age and the outcome of the trial of labour after caesarean section. In a retrospective cohort study by Odibo A.O et al (2007), it analyses the association between maternal age and vaginal birth after caesarean section among women who were undergoing the trial of labour after caesarean section from 1996 to 2000 in 17 community and university hospital in United State. A total of 13706 patients attempted trial of labour after caesarean section. They were grouped into 15-20 years old, 21-34 years old and above 35 years old. It was concluded that women age of 35 years and above were 14% more likely to had an unsuccessful trial of labour (OR = 1.14, [1.03, 1.25], P = 0.009)⁽⁷⁾. However, in another retrospective study in New Zealand involving 806 patient attempting VBAC in Middlemore Hospital from 2008 to 2009, maternal age was found to be statistically insignificant⁽⁸⁾. In another retrospective cohort study by Xing Yan-Ping et al at Cangzhou Central Hospital from January 2012 to December 2016, it conducted multivariable logistic regression study and found that one of the significant variables for the predictor of successful vaginal birth after caesarean section is maternal age less than 40 years old (OR 2.1; 95% confident interval 1.5 - 2.9)⁽⁹⁾. The differences between the results reported in the different study could be due to the parity of the patient as advance maternal age are more likely to be associated with higher parity. Therefore, further study can be done to evaluate the association between vaginal birth after caesarean section and maternal age in a patient with previous lower segment caesarean section without any previous vaginal delivery.

3.2.2 Maternal Anthropometry

Maternal anthropometry comprises of maternal height, maternal weight and maternal body mass index. According to the guideline on birth after previous caesarean section by RCOG, greater maternal height is associated with the likelihood of a successful vaginal birth after caesarean section. The exact maternal height which may influence the outcome of vaginal birth after caesarean section is widely affected by other factors such as ethnicity (eg. Asian vs Caucasian), maternal weight, maternal types of pelvis, estimated fetal weight and other obstetrical factors. In a retrospective study by McGuinness analysing maternal height as a risk factor for caesarean section due to failure of progress in labour in 997 nulliparous women in Waikato Hospital, New Zealand between 1994 - 1998, it was found that risk of caesarean section increases gradually with decreasing maternal height but it was only significant with the height less than 140cm⁽¹⁰⁾. At present, there is no local available data on the effect of maternal height among South East Asian (SEA) women on the outcome of vaginal delivery from the literature search.

There is a general perception that maternal obesity results in a lower success rate of vaginal delivery compared to normal maternal body mass index. Although numerous studies are describing an increased risk of cesarean delivery among overweight or obesity mother, the severity of this association remains ambivalent. In a meta-analysis by Chu et al, the odd ratios of caesarean delivery in overweight, obese and severely obese pregnant women were 1.46 [95% confidence interval (CI): 1.34–1.60], 2.05 (95% CI: 1.86–2.27) and 2.89 (95% CI: 2.28–3.79) as compared to a normal BMI pregnant mother⁽¹¹⁾. However, does maternal obesity patient with one previous scar have a lower success rate compared to an obese patient without any previous scar? In a study conducted at Middlemore Hospital from 2008 to 2009,

maternal BMI was found to be statistically insignificant to affect the outcome of the trial of labour after caesarean section. However, in the study, the author quoted that there is a limitation in interpreting the data as 14% of data on maternal BMI are missing⁽⁸⁾. Therefore, the association can be further explored and compared with the odds ratio of the meta-analysis by Chu et al.

3.2.3 Gestational Age

Does previous pregnancy gestational age during caesarean delivery affect the outcome of vaginal birth after caesarean section in current pregnancy? There is a common perception that previous caesarean delivery at pre-maturity is associated with the increase risk of VBAC complications particularly uterine rupture. However, in a retrospective cohort study comparing patients who had previous caesarean delivery less than or at 34 weeks of gestation against patient who had previous caesarean delivery after 34 weeks of gestation, it shows that both groups have a similar risk of uterine rupture and other maternal morbidities such as post-partum haemorrhage ⁽¹²⁾.

In a retrospective cohort study evaluating the success rate of trial of labour after caesarean section and rate of uterine rupture in patient undergone vaginal birth after caesarean section, it was found that advance gestational age is associated with high rates of unsuccessful VBAC and uterine rupture⁽¹³⁾. In the study, the patient were divided into < 37 weeks (n = 253), 37 weeks to 40 weeks and 6 days (n = 1991) and 41 weeks and above (n = 329). The rate of uterine rupture were 0% vs 1% vs 2.7% (p = 0.006) and success rate of trial of labour after caesarean section were 83% vs 76.9% vs 62.6%. (p < 0.001) respectively. However, in this study, the authors did not mention if induction of labour were included. Therefore, does induction of labour at term has a higher success rate of trial of labour after caesarean section than spontaneous labour at post-date? In another study by Palatnik et al (2015), it was reported that the success rate of vaginal birth after caesarean section is higher among patient who was induced at 39 weeks compared to expectant management after 39 weeks (73.8% vs 61.3%, p < 0.01)⁽¹⁴⁾. However, in the study, it was not mentioned if the delivery of the expectant group of the patient was by spontaneous or induced labour.

3.2.4 Pregnancy interval

Does short pregnancy interval (< 12 months) or long pregnancy interval (> 60 months) affect the success rate of vaginal birth after caesarean section? Literature search shows that only limited data on the success rate of VBAC in relation to the inter-pregnancy interval. In a retrospective study, it was found that the success rate of VBAC was similar among patients with pregnancy interval less than 24 months but decreases in those after 24 months⁽¹⁵⁾. The success rate of VBAC in patient with more than 60 months pregnancy interval was 62%. Besides the success rate of VBAC, inter-pregnancy may also affect the risk of uterine rupture. For instance, in a retrospective cohort study by Stamilio et al, it investigates if short or long pregnancy interval is associated with uterine rupture or other maternal morbidities among 13331 pregnant mothers between 1995 to 2000 in the US⁽¹⁶⁾. It was concluded that a short pregnancy interval of fewer than 6 months is associated with an increase risk of uterine rupture and the need for blood transfusion. Long pregnancy interval was not associated with any increase in major morbidities. Therefore, further studies can be done to evaluate the association between inter-pregnancy interval and the success rate of trial of labour after caesarean section.

3.2.5 Indication of previous Caesarean delivery

In a Swedish study by Fagerberg et al (2013), it conducted a retrospective cohort study to compare the association between the indication of first caesarean section and success rate of trial of labour after caesarean section⁽¹⁷⁾. The study involves records of 59643 patients from 1992 – 2007. The analysis shows that the strongest predictor for a failed trial of labour after caesarean section is previous caesarean section for diabetes mellitus or gestational diabetes mellitus (OR 4.62 [95% CI 3.79,5.63]) and previous caesarean section for birth weight above 4.5 kg (OR 4.15 [95% CI 3.74, 4.61]). Post-term pregnancy and complication during labour and delivery are also a significant predicting factor with OR of 3.66 [95% CI 3.41,3.92] and 3.87 [95% CI 3.70,4.06] respectively. The indications of a previous caesarean section associated with a higher success rate of trial of labour after caesarean section are multiple pregnancies, breech or malpresentation and placenta previa. However, this study did not specify if indication such as failed induction of labour, secondary arrest and obstructed labour were analysed. This study also did not specify the component comprise under the section of complication during labour and delivery.

3.2.6 Maternal Medical Co-morbid

Patients who are deemed high risk due to maternal medical condition often opted for ERCS rather than VBAC. This is because of self-perception that they are likely to have an unsuccessful trial of labour after caesarean section and influence of obstetrician during counselling. In a retrospective cohort study in Ohio from 2006 to 2007, the target population are grouped as high risk if they have either diabetes, hypertension or maternal obesity (BMI above 30kg/m²). From 8658 pregnant mother who is classified under high risk, only 16.6% attempted trial of labour after caesarean section (n = 1433). Despite this, the success rate of VBAC is considerably high as 68.0% had a successful trial of labour after caesarean section. Moreover, there is no statistically significance in terms of frequency of morbidities such as uterine rupture, blood transfusion and caesarean hysterectomy compared to a low-risk patient (patient with one previous lower segment uterine scar but without any of three risk factors mentioned earlier)⁽¹⁸⁾.

3.2.7 Estimated fetal weight

Estimated birth weight is also part of information considered by the obstetrician during counselling for the trial of labour after caesarean section. In a cross-sectional analytical study at Cantonment General Hospital, Rawalpindi, it analyses 95 patient by consecutive sampling technique to assess predictor for a successful trial of labour after caesarean section. 68 patients (71.6%) had a successful trial of labour after caesarean section while remaining had a caesarean section for various indication. Estimated fetal weight is statistically significant in predicting the trial of labour after caesarean section. In the patient with successful trial of labour, the mean EFW was 3.0kg. While, in the patient with an unsuccessful trial of labour, the mean EFW was 3.3kg⁽¹⁹⁾. However, this study does not recruit patient with EFW above 3.5kg and it also involves a small sample size. Therefore, further study can be done with a larger sample size to support this association.

3.2.8 Types of labour

There is a general perception that induced labour is associated with a lower success rate of trial of labour after caesarean section. In a prospective cohort study by Al-Shaikh et al (2013), it was noted that there is a significant higher rate of emergency caesarean section rate in the induced patient compared to spontaneous labour (n = 320) (36.5% vs 28.0%, p = 0.026) ⁽²⁰⁾. However, in another study by Palatnik et al (2015), it was analysed that the success rate of trial of labour after caesarean section is higher among patient who was induced at 39 weeks compared to delivery after 40 weeks either by induction or spontaneous labour (73.8% vs 61.3%, p <0.01)⁽¹⁴⁾. It was also found that induction of labour after 39 weeks has a higher success rate compared to postdate (73.8% vs 58.8%). However, in this study, it does not clarify the percentage of the patient going into spontaneous labour after 39 weeks and its success rate of trial of labour.

Several factors affect successful induction of labour in patient opted for the trial of labour after caesarean section. In a cross-sectional study by Jawaria et al (2013), 100 patient undergoing induction of labour for the trial of labour after caesarean section had their scoring calculated⁽²¹⁾. The components are shown in table below; -

COMPONENT	0	1	2
Maternal Age (yr)	Above 30	25 - 30	Below 25
Gestation Age (wks)	Below 39	39 - 40	Above 40
Indication of previous Caesarean	Non-progress of labour	Multiple pregnancy/ Postdate/ Fetal Growth Restriction/ Placental Abruption	Fetal distress/ Breech presentation
VBAC history	NIL	VBAC	History of vaginal birth prior caserean and VBAC
Bishop score	0 - 3	4 - 5	6 or more
BMI (kg/m ²)	Above 30	25 – 29.9	Below 25

It was observed that successful trial of labour after caesarean section rate is higher in patient with greater score – 38% for patient score less than 4; 58% for patient with score 4 to 6; 71% for patient with score 7 to 9 and 86% for patient with score above 9 ($p < 0.05$).

3.3 Local Study

There is a local study conducted to analysing factor influencing caesarean delivery in women with one previous lower segment caesarean section, it analyses 388 patient equally divided into two arms of 194 having a successful trial of labour after caesarean section and 194 undergone cesarean delivery⁽²²⁾. The study found that the mother with no previous vaginal delivery, estimated fetal weight more than 3.5kg and meconium stained liquor are statistically significant factors resulting in caesarean section. In this study, it did not comment on the success rate of trial of labour after caesarean section and factors promoting a likelihood of successful trial of labour after caesarean section. Factors such as maternal BMI and maternal age was found to be statistically insignificant. Moreover, there are several other factors such as the indication of previous caesarean section, type of induction of labour, use of augmentation of labour, reasons for caesarean section and effects of maternal medical condition such as hypertension, diabetes which can be further analyzed. Therefore, further research locally with a larger sample size and exploring more confounding factors can be done to support the current published research. This would help in providing extra evidence during counselling of patient for trial of labour after caesarean section or planned caesarean section in the local setting.

3.4 Risk and benefit of Trial of Labour after Caesarean Section

Successful vaginal birth after caesarean section is beneficial as it reduces hospital stay and promotes faster recovery. However unsuccessful trial of labour after caesarean section is associated with a higher risk of morbidity and mortality compared to a planned ERCS⁽⁴⁾. The outcome of VBAC was analysed by a meta-analysis done by Rossi et al (2015) on involving articles from Cochrane library, PubMed, Medline and EMBASE from January 2000 to February 2013⁽²³⁾. Eight articles were identified involving 4,038 trial of labour after caesarean section patient going for induction of labour and 13,374 trial of labour after caesarean section patient going for spontaneous labour. Overall the success rate of VBAC is at 72.2%. In the induction group, the successful VBAC rate is at 66.3% compared to 74.1% in control – spontaneous labour group. Two of the articles shows the need for instrumentation at 5.6 - 6.7%. The incidence of uterine rupture is at 0.7% with a higher rate in the induction of labour group at 1.1% compared to 0.6% in spontaneous labour (OR: 1.62; 95 % CI: 1.13–2.31). Besides, the incidence of postpartum haemorrhage is at 2.7%, with higher incidence observed in induction group at 3.4% compared to 2.5% (OR: 1.57; 95 % CI: 1.20–2.04). There is no significant difference in the need for post-partum hysterectomy in both groups from analysis of the three articles.

All patient without contraindication should be encouraged for trial of labour after caesarean section. However, thorough counselling is needed to ensure patient understand regarding their likelihood of success, risk and benefit of both VBAC and ERCS. Obstetrician plays an important role in the patient decision on VBAC or ERCS. Information needs to be conveyed in an unbiased manner, providing the patient with accurate predictive factors for the patient to make a sound judgement on her delivery plan ⁽¹⁴⁾.

CHAPTER 4: METHODOLOGY

4.1 Study Design

This is a retrospective cohort study to determine the proportion and associated factors for successful trial of labour after caesarean section among women with one previous caesarean section who deliver at Hospital Wanita dan Kanak Kanak Sabah. The study reviews patients' medical records to obtain information of interest.

4.2 Study Location

This study was conducted in Hospital Wanita dan Kanak-Kanak Sabah (HWKKS). HWKKS is a tertiary hospital which receives referrals from all district hospitals along the west-coast of Sabah;- from Hospital Sipitang (South), Hospital Ranau (East) up to Hospital Pitas (North). Therefore, it receives a significant number of obstetric patients for delivery at their center. Patients with one previous lower segment caesarean section were counselled for trial of labour after caesarean section at Specialist Clinic of Obstetric and Gynaecology HWKKS at 36 weeks to decide on the mode and timing of delivery.

4.3 Study Duration

The study duration begins from January 2019 and to complete by May 2019

4.4 Study Population

4.4.1 Reference Population: -

Pregnant mother with one previous lower segment caesarean section who undergo trial of labour after caesarean section.

4.4.2 Sampling Population: -

Pregnant mother with untested one previous lower segment caesarean section who undergo trial of labour after caesarean section in Hospital Wanita dan Kanak-Kanak Sabah at or before 2018.

4.4.3 Sampling frame: -

Patient registry in 'Buku Daftar Kelahiran HWKKS for patient who undergo untested Vaginal Birth After Caesarean Section.

4.4.4 Inclusion and Exclusion Criteria: -

The inclusion criteria for this study includes all pregnant mother with one previous lower segment caesarean section without any trial of labour after recent caesarean delivery who is presently delivering in Hospital Wanita dan Kanak-Kanak Sabah.

The exclusion criteria for this study includes patients who opted for elective repeated caesarean section or contraindicated for vaginal delivery, patients who refused for VBAC while in labour and patients who case files were unable to be traced or major incomplete data.

4.5 Sample size determination

The calculated sample size is at 775 based on objective 2 with inclusion of 20% drop-out.

Objective 1 - To determine success rate of VBAC in Hospital Wanita dan Kanak-Kanak Sabah from 2014 to 2018.

- Using incidence of success rate of VBAC at 72% (RCOG, 2012), sample size is calculated using SSCPS version 1.0.03

FORMULAE FOR ESTIMATING A PROPORTION

Formula without Finite Population Correction:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

where n = Sample size,

Z = Z statistic for a level of confidence,

P = Expected prevalence or proportion

(If the expected prevalence is 20%, then $P = 0.2$), and

d = Precision (If the precision is 5%, then $d = 0.05$).

SAMPLE SIZE CALCULATOR FOR PREVALENCE STUDIES

* USING RANDOM (NOT CLUSTER) SAMPLING

Level of Confidence = 95%

Expected P = 0.72

Population Size (N) =

* Suggested precision (d) is 0.05.

Sample Size Table

Precision (d)	Sample Size (n)		Suggestion for FPC application	Assumption (Normality)
	No FPC	With FPC		
± 0.01	7745		◀ Infinite population is assumed.	OK
± 0.02	1937		◀ Infinite population is assumed.	OK
± 0.03	861		◀ Infinite population is assumed.	OK
± 0.04	485		◀ Infinite population is assumed.	OK
▶ ± 0.05	310		◀ Infinite population is assumed.	OK
± 0.06	216		◀ Infinite population is assumed.	OK

- The calculated sample size is 310. With addition of 20% account for drop-out, the calculated sample size is 372.

Objective 2 - To determine factors associated with successful VBAC in Hospital Wanita dan Kanak-Kanak Sabah

- Using data from Van der Merwe et al (2013) on statistically significant factors which affect VBAC

FACTOR	Description	Sample Size per arm
Parity	To detect the difference of 15% (P_0 81.4% vs P_1 66.4%) between parity 1 against parity 2 and above. P_0 - incidence of parity 2 and above was estimated at 81.4%	133
Induction of labour	To detect the difference of 10% (P_0 75.8% vs P_1 65.8%) between induced labour against spontaneous labour. P_0 - incidence of spontaneous labour undergo VBAC is estimated at 75.8%	323
Indication of previous CS (Fagerberg et al, 2013)	To detect the difference of 20% (P_0 82.2% vs P_1 62.2%) between non-recurring factors for caesarean section (eg. Multiple pregnancy/Breech) against recurring factors P_0 - incidence of successful VBAC with previous history of caesarean section due to non-recurring factors is estimated at 82.2%	78

- The sample size is calculated using PS software (Dupont & Plummer, 1997) version 3.1.2 to calculate the sample size based on comparison of two proportions.
- The calculated sample size is $323 \times 2 = 646$ plus 20% drop out = 775.

4.6 Sampling Method

The sampling method of this study is via random sampling. After obtaining the written permission form the Hospital Director of HWKKS to access the patients case files and ethical approval from MOH and JPEM USM to conduct the study, records of deliveries will be traced from 'Buku Daftar Kelahiran' Labour Suite registry book HWKKS starting from 2018 and backward will be reviewed and names of the patients who has undergone Vaginal birth after Caesarean (VBAC) will be recorded for purpose of tracing of the case files. The list will be used to facilitate tracing of case files at the record rooms and subject case files which are unable to be traced or does not fulfil inclusion and exclusion criteria will be discarded. Record room of HWKKS arranges case files according to year followed by alphabetical order of their names. The case files will be reviewed for specific data as listed in section of variables of the study. Data collection is completed once 775 sets of data is collected.

4.7 Mode of Data Collection

The data are collected by direct entry into SPSS version 24 for analysis

4.8 Variables in Study

The data collected in this study as per Appendix 1 (Research Performa) includes; -

- *Biodata* - Maternal age, Ethnicity, Gravida and Parity, Gestational age at delivery
- *Biophysical Profile* - Maternal height, Maternal delivery weight
- *Previous Obstetrical History* - Previous birth weight, Previous year of caesarean delivery, Indication of previous caesarean delivery, Complications of previous caesarean delivery
- *Current Antenatal History* - Maternal diabetes and hypertension
- *Current Intrapartum History* - Estimated fetal weight, Types of labour, Method of Induction, Oxytocin augmentation usage – dosage and duration
- *Delivery Outcome* – Delivery method, Birth Weight, Gender, Post-Partum Haemorrhage and its cause.

4.9 Operative Definitions

	DESCRIPTION
Caesarean Section	Surgical procedure involving incision on the abdomen and uterus for the delivery of fetus
Vaginal Birth after Caesarean (VBAC)	Trial of labour after caesarean delivery
Elective Repeated Caesarean Section (ERCS)	Planned repeat caesarean section for a woman who has previously undergone caesarean delivery
Uterine Rupture	Tear in the wall of uterus
Post-date pregnancy	Pregnancy exceeding 40 weeks period of gestation
Post-term pregnancy	Pregnancy exceeding 42 weeks period of gestation
Fetal Macrosomia	Birth weight exceeding 4000gm
Induction of labour	Process of artificially stimulating the uterus to start labour
Caesarean Hysterectomy	Removal of uterus at time of caesarean section