

Ethnic Variations in Trial of Labor after Cesarean in an Understudied Asian and Pacific Islander Population

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Abstract

Background: Increasing the vaginal birth after cesarean (VBAC) rate for appropriate candidates would help to decrease the high cesarean delivery rate in the United States. The purpose of this study is to examine ethnic differences in trial of labor after cesarean (TOLAC) and VBAC rates in a largely understudied Asian and Pacific Islander (PI) population.

Methods: Retrospective chart review was performed on all women with a term, singleton, and live, cephalic fetus and with a history of 1 or 2 prior cesarean deliveries who delivered at a single institution in Honolulu, Hawaii between the years 2010 and 2016. Multiple logistic regressions were performed to examine the likelihood of a successful VBAC for twelve different ethnicities.

Results: A total of 4,517 women met study criteria. Of the 37.8% that attempted labor, 80.1% had a successful VBAC, resulting in an overall 30.3% VBAC rate for the population studied. Native Hawaiians and other PI groups (Marshallese, other Micronesian, other PI) (n=1,814) had the highest TOLAC rates (37.6-78.5%). Adjusted odds of successful VBAC were similar to non-Hispanic Whites in all groups except for Marshallese and other Micronesians (aOR 4.24, 95% CI 2.02-8.90 and aOR, 3.51, 95% CI 1.83-6.76, respectively).

Conclusions: The high VBAC rate in the population studied was largely due to a high TOLAC rate. A woman's ethnicity should not be a deterrent from attempting VBAC. Further research should be performed to see if these findings can be replicated.

Keywords: Ethnicity, Obstetrics, Race, Trial of labor, Vaginal birth after cesarean

Abbreviations

aOR = adjusted odds ratio

BMI = body mass index

CD = cesarean delivery

CI = confidence interval

PI = Pacific Islander

TOLAC = trial of labor after cesarean section

VBAC = vaginal birth after cesarean section

Introduction

In the United States, the rate of cesarean delivery (CD) has increased more than six-fold between the years 1970 and 2016, with the most recent rate reported to be 31.9% [1]. Increasing the vaginal birth after cesarean (VBAC) rate for appropriate candidates would help to decrease this high CD rate and potentially prevent surgical

complications associated with CD, such as blood transfusion, infection, venous thromboembolism, and injury to nearby organs.

History of prior vaginal delivery is associated with an increased probability of a successful TOLAC [2-7]. Whereas advancing maternal age [2-4], gestational age beyond 40 weeks [8,9] obesity [2-4,10,11], recurrent indication for CD [2-7], preeclampsia [2,11], and induction of labor [2,4,13] have an inverse association with successful TOLAC. Not much is known about the association between TOLAC and ethnicity. Studies have shown that Blacks and Hispanics are less likely to have a successful VBAC compared to Whites [2-4,14-16]. Conflicting data exists regarding the VBAC rate among Asians and Pacific Islanders (PIs) [15,16], a widely heterogeneous group of ethnicities that are often treated as single entity.

Located in the middle of the Pacific Ocean, Hawaii has a very unique ethnic population with a high percentage of Asians and PIs. This

study was conducted at a high-volume tertiary maternity center in Hawaii. The purpose of this study is to examine the rates of TOLAC and VBAC among different ethnic groups and to determine the association between ethnicity and successful TOLAC. To date, this is the largest study to examine TOLAC and VBAC among PIs and to examine PIs in detailed ethnic groups. Furthermore, this study is significant because most ethnic literature focuses only on VBAC, whereas this ethnic study examines not only VBAC but also TOLAC.

Methods

This study is a retrospective chart review from January 1, 2010 to December 31, 2016. Inclusion criteria include all women with a term, singleton, live, cephalic fetus and a history of 1 or 2 prior CD who delivered at a single institution in Honolulu, Hawaii. Women with contraindications to trial of labor such as placenta previa, vasa previa, history of classical CD, or history of uterine rupture were excluded. Rates of TOLAC and VBAC were examined by self-reported ethnicity. The study's twelve most commonly reported ethnicities were used in data analysis. Obstetrical and demographic information were also collected. Study exemption was obtained from the Hawaii Pacific Health Research Institute.

Data were analyzed using IBM SPSS Statistics for Windows, Version 25 (IBM Corp., Armonk, NY). Chi-squared test was performed for descriptive data. Multiple logistic regressions were performed to examine the likelihood of a successful VBAC for twelve different ethnicities. These twelve ethnicities represented the most common self-reported ethnicities among women with a history of 1 or 2 prior CD. Non-Hispanic Whites served as the reference group, and adjustments were made to account for maternal age, insurance type, education, primary language, body mass index (BMI), gestational age, history of recurrent indication for CD, history of prior vaginal delivery including VBAC, pregnancy induced hypertension, induction of labor, and cervical exam on admission. Statistical differences were considered significant for p-values less than 0.05.

Results

A total of 4,596 women were identified to have a term, singleton, live, cephalic fetus and a history of 1 or 2 prior CD from January 1, 2010 to December 31, 2016 (Figure 1).

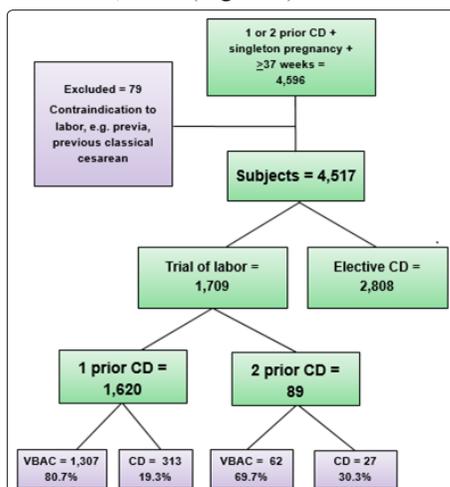


Figure 1: Study subjects and rates of TOLAC and VBAC

Of these women, 79 women were excluded due to a contraindication to labor, resulting in 4,517 women who met study criteria and were

candidates for TOLAC. Among these TOLAC candidates, 62.2% (n=2,808/4,517) of women opted for an elective CD and 37.8% (n=1,709/4,517) women pursued a trial of labor. Of these women who attempted TOLAC, 94.8% (n=1,620/1,709) of women had a history of 1 prior CD and 5.2% (n=89/1,709) of women had a history of 2 prior CDs. The overall rate of successful VBAC was 80.1% (n=1,369/1,709) for the studied population. When subcategorized by history of 1 or 2 prior CDs, the rate of successful VBAC was 80.7% (n=1,307/1,620) and 69.7% (n=62/89), respectively.

When comparing women with a successful TOLAC versus failed TOLAC, there was no significant difference between age, education, insurance, primary language, or pregnancy related hypertension (Table 1). However, there were significant differences between gestational age, BMI, history of prior vaginal delivery, recurrent indication for CD, and induction of labor. Women with a history of prior vaginal delivery were more likely to have a successful TOLAC (p<0.0001). On the other hand, women with advancing gestational age (p<0.0001), increasing obesity (p<0.0001), recurrent indication for CD (p<0.0001), and induction of labor (p<0.0001) were more likely to have a failed TOLAC.

Table 1: Subject demographics by successful and failed TOLAC

	Attempted TOLAC (n=1,709)	Successful TOLAC (n=1,369)	Failed TOLAC (n=340)	P-value
Age (years)				0.65
<20	0.4% (7)	85.7% (6)	14.3% (1)	
20-34	80% (1,368)	79.7% (1,090)	20.3% (278)	
>34	19.6% (334)	81.7% (273)	18.3% (61)	
Highest level of education				0.88
<High school	14.2% (242)	78.5% (190)	21.5% (52)	
High school graduate	36.7% (628)	79.8% (501)	20.2% (127)	
>High school	49.1% (839)	80.8% (678)	19.2% (161)	
Public or no insurance	61% (1,044)	79.7% (832)	20.3% (212)	0.59
English speaking	73.7% (1,259)	80.5% (1,014)	19.5% (245)	0.45
Gestational age (weeks)				<0.0001
37-38	0.4% (558)	84.9% (474)	15.1% (84)	
39-40	80% (999)	79.5% (794)	20.5% (205)	
41+	19.6% (152)	66.4% (101)	33.6% (51)	
Body mass index (kg/m²)				<0.0001
30.0-34.9	29.6% (506)	79.6% (403)	20.4% (103)	
35.0-39.9	21.7% (370)	76.8% (284)	23.2% (86)	
40.0+	15.9% (271)	74.8% (202)	25.2% (69)	
History of prior vaginal delivery	48.4% (827)	89.2% (738)	10.8% (89)	<0.0001
Recurrent indication for CD	28.7% (491)	71.7% (352)	28.3% (139)	<0.0001
Pregnancy related hypertension	9.9% (170)	75.3% (128)	24.7% (42)	0.98
Induction of labor	27.6% (472)	73.3% (346)	26.7% (126)	<0.0001

Overall, the rate of successful TOLAC by ethnicity ranged from 73.8% to 87.5%. All ethnicities had a high rate of successful TOLAC. PI groups including Native Hawaiian (n=884), Marshallese (n=172), other Micronesians (n=474), and other PI (n=324) had the rates of

highest attempted TOLAC, ranging from 37.6% to 78.5% (Table 2). These groups also had the highest rates of overall VBAC, ranging from 31.5% to 59.3%.

Table 2: Rates of TOLAC and VBAC by ethnicity

Ethnicity	Attempted TOLAC	Successful TOLAC	Overall VBAC
Non-Hispanic White (n=523)	28.3%	85.8%	24.3%
Non-Hispanic Black (n=56)	35.7%	80.0%	28.6%
Hispanic (n=138)	34.8%	81.3%	27.5%
Chinese (n=217)	27.6%	83.3%	23.0%
Filipino (n=989)	29.6%	80.2%	23.8%
Japanese (n=454)	24.4%	83.8%	20.5%
Other Asian (n=221)	30.3%	80.6%	24.4%
Native Hawaiian (n=844)	37.6%	83.9%	31.5%
Marshallese (n=172)	78.5%	75.6%	59.3%
Other Micronesian (n=474)	70.0%	73.8%	51.7%
Other Pacific Islander (n=324)	52.5%	81.8%	42.9%
Other (n=105)	7.6%	87.5%	6.7%
P-value	<0.0001	<0.0001	<0.0001

The adjusted odds (aOR) of a successful TOLAC was similar to Non-Hispanic Whites in all ethnic groups except for Marshallese (aOR 4.24, 95% CI 2.02-8.90) and other Micronesian (aOR, 3.51, 95% CI 1.83-6.76) women (Table 3).

Table 3: Adjusted odds ratio (aOR) for successful VBAC by ethnicity

Ethnicity	aOR*	Confidence Interval
Non-Hispanic White (n=523)	1.00	-
Non-Hispanic Black (n=56)	1.61	0.49, 5.32
Hispanic (n=138)	1.08	0.43, 2.67
Chinese (n=217)	1.41	0.58, 3.45
Filipino (n=989)	1.69	0.94, 3.06
Japanese (n=454)	1.23	0.59, 2.57
Other Asian (n=221)	1.44	0.63, 3.30

Native Hawaiian (n=844)	1.44	0.78, 2.68
Marshallese (n=172)	4.24	2.02, 8.90
Other Micronesian (n=474)	3.51	1.83, 6.76
Other Pacific Islander (n=324)	1.48	0.73, 3.00
Other (n=105)	1.47	0.16, 13.6

Discussion

Minority populations in the United States are rapidly growing and predicted to account for 50% of the nation by the year 2045 [17]. Yet little is known about TOLAC and VBAC among ethnic minorities. It is essential that racial disparities in the available medical literature be addressed in order to improve health outcomes in the United States. The purpose of this study is to examine ethnic differences in TOLAC and VBAC rates in a largely understudied Asian and PI population. To date, this is the largest study to examine TOLAC and VBAC among PIs and to examine PIs in detailed ethnic groups.

In the United States, the TOLAC rate is 28.8% and the success rate is 57.1% [18]. In this cohort, the TOLAC rate was 37.8% and the success rate was 80.1%, which were both higher than national rates. This cohort's high overall VBAC rate is likely attributed to its high TOLAC rate. Moreover, TOLAC and VBAC rates were high despite having a relatively high risk population with a relatively high prevalence of obesity (67.2%), recurrent indication for CD (28.7%), pregnancy-related hypertensive disease (9.9%), induction of labor (27.6%), and low socioeconomic status (public or no insurance 61.0%, non-English speaking 26.3%). These results encourage and support TOLAC, even in women deemed "high risk".

A paucity of data exists on VBAC among Asians and PIs. A majority of previous studies combine Asians and PIs into a single ethnicity; when in reality, Asians and PIs represent a widely heterogeneous group. Edmonds et al 2016 reported an aOR of 1.41 for VBAC among Asians and PIs compared to non-Hispanic Whites [15], which was similar to the aORs in this study's Asian groups (Chinese 1.41, Japanese 1.23, other Asian 1.44). The PI population on the continental United States is relatively small, so a majority of these studies largely represent Asians rather than PIs. To date, this is the largest study to examine TOLAC and VBAC among PIs and in detailed PI ethnic groups.

This unique cohort was comprised of a large number of understudied PIs which were further categorized into detailed ethnic groups. This study found that PI groups had the highest rate of attempted TOLAC (Native Hawaiian 37.6%, Marshallese 78.5%, Other Micronesian 70.0%, and other PI 53.5%) and overall VBAC (Native Hawaiian 31.5%, Marshallese 59.3%, other Micronesian 51.7%, and other PI 42.9%). Rate of successful TOLAC was similar in all ethnic groups, except for the Marshallese and other Micronesians who had the lowest rates of successful TOLAC (Marshallese 75.6%, other Micronesians 73.8%) but interestingly the highest odds ratio (Marshallese aOR 4.24, other Micronesians aOR 3.51). Differences in successful TOLAC are likely attributed to differences in subject demographics, such as obesity which is a rapidly growing epidemic among PIs [19,20], but other confounding factors like provider biases and underlying biological variations cannot be ruled out.

For example, a large percentage of the Marshallese and other Micronesian population in Hawaii are recent immigrants, which likely dramatizes differences from other ethnicities who have resided in the United States for multiple generations.

Strength of this study is its relatively large sample size with over 4,500 women eligible for TOLAC and over 1,700 women attempting TOLAC. Almost no other study analyzes eligible TOLAC candidates. Detailed information regarding subject demographics, pregnancy complications, and labor characteristics was readily available via electronic medical records. Moreover, ethnicity was self-reported to minimize reporting error.

A limitation of this study is that it was performed at a single institution. While the overall sample size was relatively large, the number of subjects in each ethnic group was relatively small, and non-Hispanic Blacks were especially underrepresented. Another study limitation was the absence of standardized labor management in this retrospective study. Therefore, some subjects may have been inappropriately managed, leading to a failed TOLAC which could have been potentially avoided. However, the benefits of non-standardized labor management make this study generalizable to real life situations.

In 2010, the National Institutes of Health organized a conference on VBAC and concluded that TOLAC was a reasonable option for many women with a prior CD. The committee also recognized that “little is known about population-based rates and patterns of utilization of trial of labor after previous cesarean deliveries [21]”. This study found that the rate of successful TOLAC was similar in all ethnic groups, except for the Marshallese and other Micronesians who had higher rates of successful TOLAC. In order to increase VBAC rates, attempted TOLAC rates must first increase. In conclusion, a woman’s ethnicity should not be deterrence from attempting TOLAC. Further research should be performed to determine if these findings can be replicated.

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