RESEARCH ARTICLE

The Rate and Characteristics of Cesarean Section Performed at a Tertiary Referral Hospital and District Hospital in Bali, Indonesia, Using Robson Classification System during the Period of January to December 2018

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Abstract

Aim: This study is aimed to compare the rates and characteristics of cesarean section (CS) based on the Robson classification system in a tertiary referral hospital and district hospital in Bali, Indonesia.

Materials and methods: A retrospective descriptive study was conducted at Sanglah Tertiary Hospital, Denpasar, and Sanjiwani District Hospital from the period of January to December 2018. The data were collected from the medical records and analyzed using simple statistical measures.

Results: CS rates at Sanglah Tertiary Hospital and Sanjiwani District Hospital were 34.3% (385/1121) and 21.5% (212/984), respectively. In Sanglah Tertiary Hospital, the highest CS rate was found in the age-group of 20–35 years, primigravida, term pregnancy, and among Robson group X. Compared to Sanjiwani District Hospital, the clinical characteristics were almost similar but the highest CS rate was found among Robson group IV.

Conclusions: Interventions, such as audit feedback, quality improvement, and multifaceted strategies, are needed to change clinical practice and reduce the rate of CS. The Robson classification is recommended to be used as a CS audit tool.

Clinical significance: A safe and timely CS remains a major challenge in countries with a high maternal mortality ratio, which poses new challenges to these countries in reducing CS performed without appropriate indications.

Keywords: Cesarean section, Characteristics, Robson classification.

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Introduction

The crude birth rate of cesarean section (CS) is an important global indicator for measuring access to obstetric services. In many countries, especially high-income or developed countries, the CS rate has increased steadily during the past three decades.[1] The rise in CS rate is associated with maternal morbidities, such as increased blood transfusions, uterine scar rupture, placenta accreta, placenta previa, and hysterectomies.[2] CS rate has been increasing during the last 50 years. The rate was 5% in the 1940s and 1950s and remained unchanged for 10–15 years. In the late 1970s, the rate rose to 15% and remained unchanged for the next 10 years. In the last decade, there has been a dramatic increase in the CS rate worldwide, which now exceeds 30% in some regions.[3] The rising CS rate is of worldwide concern, particularly in well-resourced countries. The rate has increased from 23.3% in 2000 to 33% in 2013 in Australia.[4]

Data from a WHO multicountry survey (WHOMCS) performed in 2010–2011 involving 21 countries reported a CS rate of 31.2% compared to the previous rate of 26.4% in the WHO global survey (WHOGS) performed in 2004–2008. CS rate in Sri Lanka, Brazil, and Mexico, i.e., countries with a high human development index (HDI), was 33, 47, and 47.5%, respectively. CS rate among moderate HDI countries was 47% for China, 39.4% for Thailand, and 19.3% for India. Data from Pakistan Demographic Health Survey reported that in 2012–2013, the rate of CS was 14%. Nigeria and Nepal, which are low HDI countries, had a CS rate of 20.4 and 23.9%, respectively.[2]

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In Indonesia, data from Basic Health Research or Riset Kesehatan Dasar reported that the CS rate during the period of 2010–2013 was 9.8% for the national average and 17.3% for the Bali province. This data placed Bali in the third position with the highest CS rate in Indonesia, behind Jakarta and Riau.[5] In Sanglah Tertiary Hospital, Bali, of 1,001 deliveries in 2017, 416 cases (41.6%) were delivered through CS. Previous data in 2016 reported that of 919 deliveries, 292 (31.7%) were delivered through CS.[6] CS rate in Sanjiwani District Hospital, Bali, in 2013 was 24% including in the obstetrics emergency room 20.0% and the rest is elective surgery.[7]

A study conducted by WHO shows that CS will increase maternal morbidity and mortality (2%), as well as neonatal mortality, the increased number of care in neonatal care units, and the increased rate of preterm delivery.[8] The determinants of rising cesarean section trends worldwide are controversial. The rising of this trend, argued by some authors, is largely driven by the rising use of inappropriately indicated CS. Henceforth, it can pose unnecessary risks to both mothers and neonates.[1] Therefore, CS performed without an appropriate indication needs to be reduced in order to reduce maternal morbidity and mortality and reduce the amount of unnecessary health financing. To be able to do this, we need a standardized and universally agreed system that can be used to monitor and compare the rate of CS in a health facility from time to time and among health facilities with different environments.[9]

However, a deeper understanding of factors that drive the increase in CS rate across countries has been complicated by the absence of international consensus regarding a universal CS classification system. A 2011 systematic review by Torloni and colleagues identified the 10-group classification system proposed by Robson in 2019 as the most appropriate system to compare CS rates.[1] In 2014, WHO recommended the use of a standardized classification system to assess and monitor CS rate in a health facility for a different period of time, as well as standardize in comparing CS rate among health facilities with different backgrounds and experiences. The classification was introduced by Michael Robson in 2001. The system is later known as "Robson classification" system.[1,9,10]

Robson system classifies delivery into 10 groups according to five fundamental parameters, i.e., the obstetric history, the onset of labor, fetal presentation or lie, number of fetuses, and the gestational age. The 10 Robson categories are mutually exclusive and totally inclusive and can be applied prospectively since each case can be classified immediately based on a few variables that are routinely recorded upon admission. This system can aid in institution-specific monitoring and auditing and offers a standardized comparison method between institutions, countries, and timepoints. The Robson classification has been used to analyze trends and determinants of CS in healthcare facilities in both high- and low-income countries and has also been applied to the state, national, and international datasets. Data from eight Latin-American countries in the WHOGS of Maternal and Perinatal Health are a good example of the use of the Robson classification system.[1,11]

Sanglah General Hospital is a tertiary referral hospital based in Denpasar that serves as a referral center for Bali and Nusa Tenggara regions. Meanwhile, Sanjiwani District Hospital is a secondary referral hospital based in Gianyar that serves as a referral center for the East Bali region. Both hospitals differ in their background and health service profile in terms of the difference in the number and the characteristics of obstetric cases presented, their pattern of care, as well as the provision of subspecialistic vs specialistic obstetric services. Therefore, this study is aimed to determine the rate and characteristics of CS in a tertiary referral hospital and district hospital in Bali, Indonesia, according to the standardized Robson classification system.

Materials and Methods

This is a retrospective descriptive study conducted at the Department of Obstetrics and Gynecology, Sanglah Tertiary Hospital and Department of Obstetrics and Gynecology, Sanjiwani District Hospital, Bali, Indonesia, from January to December 2018. Patients who underwent CS during the study period were recruited into the study population. Data about the clinical characteristics and category of CS based on the Robson classification system were retrieved from the medical records. The data collected were then analyzed using simple statistical measures, such as percentages and proportions, and then a descriptive statistical analysis was performed.

Obstetric cases were classified into 10 groups according to the Robson classification system. The operational definition for each group is summarized in Table 1.

Group I: Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labor. Group II: Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation, who had induced labor or were delivered by CS before labor. Group III: Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labor. Group IV: Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation, who had induced labor or were delivered by CS before labor. Group V: All multiparous women with at least one previous CS, with a single cephalic pregnancy, ≥37 weeks gestation. Group VI: All nulliparous women with a single breech pregnancy. Group VII: All multiparous women with a single breech pregnancy including women with previous CS(s). Group VIII: All women with multiple pregnancies including women with previous CS(s). Group IX: All women with a single pregnancy with a transverse or oblique lie, including women with previous CS(s). Group X: All women with a single cephalic pregnancy, <37 weeks gestation, including women with previous CS(s).[12]

Furthermore, the number and proportion of each group are reported using a seven-column report table (Table 2), as proposed by Robson. Each column signifies a specific number or rate. Column 1 signifies the group name and/or number and their operational

Table 1: Seven columns of report table[12]

Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*	*Column 7*
Group name and/or number and definition (with subdivisions for groups II, IV, and V, if these are of interest to the users)	Total number of CS in each group	Total number of women delivered in each group	Relative group size to overall facility population. For each of the 10 groups in percentage	CS rate in each group. For each of the 10 groups, in percentage	Absolute group contribution to the overall CS rate. For each of the 10 groups, in percentage	The relative contribution of each of the 10 groups to the overall CS rate For each of the 10 groups, in percentage

Table 2: Characteristics of CS according to Robson classification system in Sanglah Tertiary Hospital and Sanjiwani District Hospital[7,13]

	Column 2		*Column 3*		*Column 4*		*Column 5*		*Column 6*		*Column 7*	
Column 1	*Sanglah*	*Sanjiwani*	*Sanglah*	*Sanjiwani*	*Sanglah*	*Sanjiwani*	*Sanglah*	*Sanjiwani*	*Sanglah*	*Sanjiwani*	*Sanglah*	*Sanjiwani*
I	29	24	277	205	24.71	20.83	10.47	13.2	2.59	2.4	7.53	11.3
II	52	38	66	97	5.89	9.86	78.79	39.1	4.64	3.9	13.51	17.9
III	29	17	323	391	28.81	39.74	8.98	4.3	8.98	4.3	7.53	8.0
IV	43	51	49	157	4.37	15.95	87.76	32.4	3.84	5.2	11.17	24.0
V	61	50	70	68	6.24	6.91	87.14	73.5	5.44	5.1	15.84	23.5
VI	14	8	23	11	2.05	1.12	60.87	72.7	1.25	0.8	3.64	3.7
VII	29	8	41	13	3.66	1.32	70.73	61.5	2.59	0.8	7.53	3.7
VIII	20	1	34	6	3.03	0.61	58.82	16.6	1.78	0.1	5.19	0.4
IX	18	7	18	7	1.61	0.71	100	100	1.61	0.7	4.67	3.3
X	90	8	220	29	19.63	2.95	40.91	27.5	8.03	0.8	23.38	3.7

definition is in accordance with Table 1. Columns 2 and 3 signify the total number of CS and delivery for each group, respectively. Column 4 represents the relative group size to the overall facility population. Column 5 represents the rate of CS for each group and is presented within percentage (%). Columns 6 and 7 represent the absolute and relative group contribution to the overall CS rate, respectively.

Results

Throughout 2018, CS rates at Sanglah Tertiary Hospital and Sanjiwani District Hospital were 34.3% (385/1121) and 21.5% (212/984), respectively. The highest rates of CS in Sanglah Tertiary Hospital and Sanjiwani District Hospital both were found among the age-group of 20–35 years, primiparous women, and at term pregnancy (Figs 1 to 3).

Figure 1 shows that the majority of CS subjects at Sanglah Tertiary Hospital was in the age-group of 20–35 years with 274 subjects (71.2%), followed by the age-group of >35 years with 101 subjects (26.2%) and the age-group of <20 years with 10 subjects (2.6%). The results obtained were similar to Sanjiwani District Hospital, which found that most CS subjects were in the age-group of 20–35 years with 155 subjects (73.1%), followed by the age-group of >35 years with 45 subjects (21.2%) and the age-group of <20 years with 12 subjects (5.7%).

From the data shown in Figure 2, we found that 123 subjects with 0 parity (31.9%), followed by 107 subjects with 1 parity (27.8%), 100 subjects with 2 parities (26.0%), and 55 subjects with 3 parities (14.3%) underwent CS at Sanglah Tertiary Hospital. Meanwhile, at Sanjiwani Regional Hospital, we found that 83 subjects (39.1%) with 0 parity, 66 subjects (31.1%) with 1 parity, 51 subjects with 2 parities (24.1%), and 12 subjects (5.7%) with 3 parities underwent CS.

Figure 3 shows that most of the gestational ages at Sanglah Tertiary Hospital were term pregnancies (254 subjects or 66.0%). The remaining 131 subjects (34.0%) were preterm pregnancies. These results were similar to Sanjiwani District Hospital, in which 195 subjects (92.0%) were term pregnancies and 17 subjects (8.0%) were preterm pregnancies.

Table 2 summarizes direct comparison of CS rate and characteristics between Sanglah Tertiary Hospital and Sanjiwani District Hospital. In Sanglah Tertiary Hospital, the highest rate of CS was found among group IX, while the highest contribution to the overall CS rate was from group X. In Sanjiwani District Hospital, the highest rate of CS was also found among group IX, while the highest contribution to the overall CS rate was from group IV.

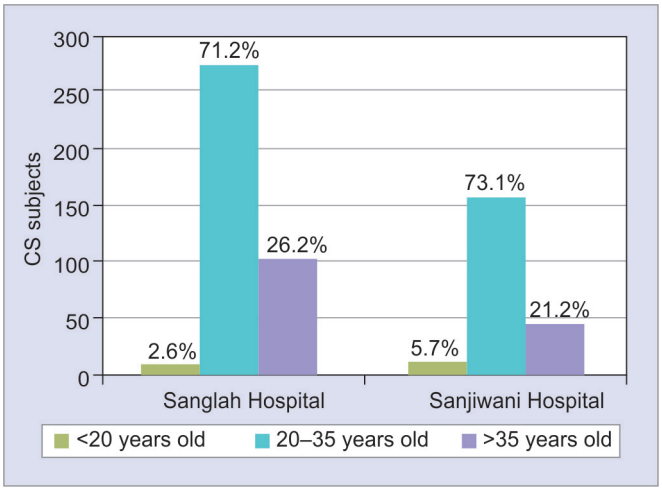

Fig. 1: Comparison of maternal age among subjects who underwent CS in Sanglah Tertiary Hospital and Sanjiwani District Hospital

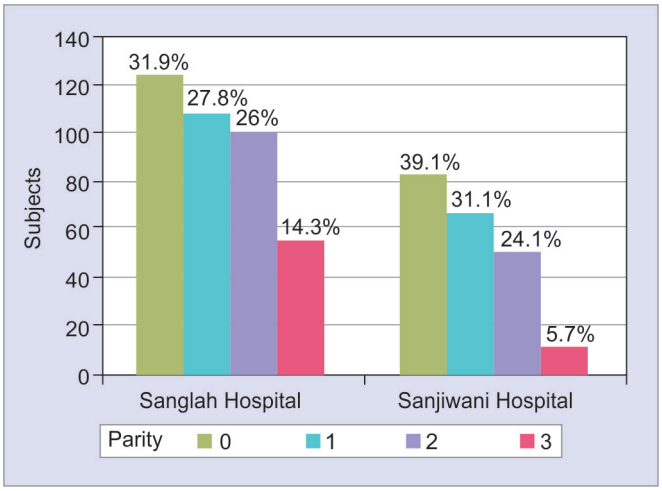

Fig. 2: Comparison of the number of parities among subjects who underwent CS in Sanglah Tertiary Hospital and Sanjiwani District Hospital

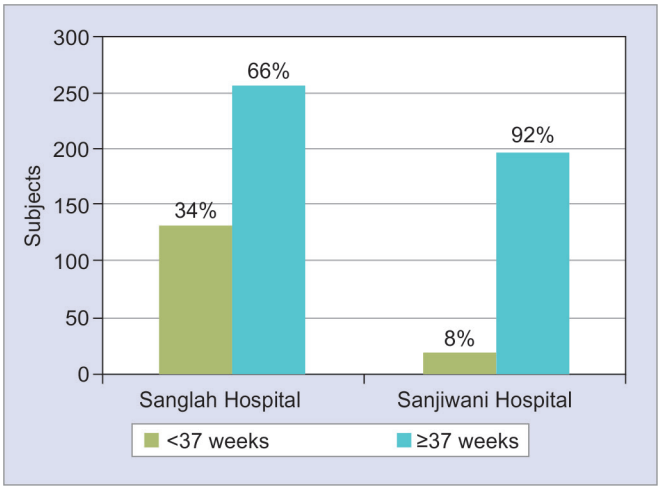

Fig. 3: Comparison of the gestational age among subjects who underwent CS in Sanglah Tertiary Hospital and Sanjiwani District Hospital

Discussion

In this study, we found that the rate of CS in Sanglah Tertiary Hospital and Sanjiwani District Hospital was 34.3 and 21.5%, respectively. Therefore, the CS rate in our population is still higher than the national and regional rate reported in 2010–2013, where the CS rate for those periods was 9.8% for the national average and 17.3% for Bali province.[5] The CS rate is also higher than the ideal CS rate proposed by the International Health Care Community, as endorsed by WHO, which is between 10 and 15%. WHO reported that one in three patients who give birth undergo a CS.[13]

Our data show that there is an increase in the rate of CS with increasing age at pregnancy. A study in Denmark reported an increase in the incidence of CS with increasing age in pregnancy and the CS rate at maternal age over 35 years was 21%. Pregnancy at this age has been known to be closely related to pregnancy complications, such as high blood pressure/preeclampsia, gestational diabetes mellitus, placenta previa, and miscarriages. These factors can contribute to increased risk of CS.[14] Our data also show that the CS rate decreases with the increasing number of parity. A similar finding was also reported from a study by Hanson which involved 34,063 research data taken from 2007 to 2013.[15] Most CSs in our study were performed at term gestational age. A similar result was reported from a study by Begum et al. which involved 2,549 deliveries with a CS level of 35% and term CS contributed to 89.14% of the CS rate.[16] The low CS rate in preterm delivery may in part be due to the inadequate survival rate and perinatology ability.

In both hospitals, the highest rate of CS came from group IX, due to malpresentation. However, the highest contribution to the overall CS rate came from group X in Sanglah Tertiary Hospital and group IV in Sanjiwani District Hospital. This high CS rate in Sanglah Tertiary Hospital is due to the high number of referral cases from secondary hospitals in Bali due to the NICU requirement. Meanwhile, the high CS rate in Sanjiwani District Hospital was due to the ripening policy not being implemented so that there were many failure inductions. This occurs due to the cases of uterine rupture on induction using misoprostol. Data obtained from Canada and India show that CS in group IV is the second-lowest of all groups. In Canada, during 2010-2011, the rate of CS in group IV was 11.4% and accounted for 1.1% of total deliveries. In India, the rate in group IV was 6.66% and accounted for 0.14% of the overall CS rate.

For group IV, the rate of induction failure was 60% which is the most common indication for CS, followed by fetal distress (26.7%) and maternal indications (13.3%). From the category of CS, it was found that elective CS was performed in 10.8% while emergency CS was performed in 80.2% and the remaining 9% was performed in green code CS. There were 23 cases conducted by elective CS. Of the 179 cases of delivery with a history of one cesarean section, 103 cases (57.3%) were tested for a trial of labor after cesarean (TOLAC) with a success rate of 56 cases (54.4%). The low success was due to the policy of not accelerating labor cases with dystocia; this was done because there were no guidelines to predict the success of TOLAC.[17]

The second-largest contributor to the CS rate in both hospitals in this study was group V. Group V is the highest contributor to the overall CS rate in both Canada and India. This may in part be due to the presence of cases with more than one previous CS within group V, which is the absolute indication for CS.[17] The high number of CS in group V was also due to policies in hospitals that did not allow TOLAC in cases of CS history with premature rupture of membranes. Acceleration is not permitted in cases of uterine inertia on a patient with a CS history. In women with a previous history of CS, 56% were offered elective CS, while 44% were offered to undergo TOLAC. However, the rate of TOLAC continues to decline due to the fear of the risk of uterine rupture.[4] The high contribution to group V reflects the quality of antenatal care.

The rate of CS in groups VI and VII reflects the number of breech presentations of labor. In Canada, the rates of CS in primigravida and multigravida with breech delivery were 94.4 and 89.2%, respectively. The high CS rate in Canada is probably due to the counseling results of the term breech trial study on vaginal breech delivery, resulting in an outcome of mortality and serious morbidity occurring 3.6 times compared to CS.[17] Groups VII and IX were the least contributor to the overall CS rate in both hospitals in this study. In these groups, CS was performed due to maternal disease, antepartum hemorrhage, malpresentation, multifetal pregnancy, and fetal distress.

A high rate of CS does not reflect a high quality of healthcare and does not necessarily reduce the maternal and perinatal morbidity and mortality rates. Various guidelines including those issued by WHO show that the optimal CS level is around 15%. A rate below 5% implies that most women do not have access to surgical obstetric care, while a rate higher than 15% indicates excessive use of CS procedures for weak indications. CS increases the length of hospital stay, the need for blood transfusion, and the risk of anesthetic complications, such as thromboembolism and infection at the surgical site. As the rate of CS increases, the risk of bladder injury and placental adhesion also increases with serious maternal morbidity and even death.[18]

Vogel in his study tried to analyze the contribution of certain groups to the CS rate. He conducted two WHOMCSs and concluded that the proportion of women with a history of previous CS had increased with increasing CS. The use of induction, CS performed before the onset of labor, and CS after induction in multipara also contribute to the increasing CS rate. Vogel reported that groups II and IV had higher CS levels compared to groups I and III.[1]

Therefore, it is necessary to limit labor induction. In 2014, ACOG released clinical guidelines on induction to limit the number of CS deliveries. Induction of pregnancy older than 41 0/7 weeks must be performed to reduce the rate of CS and the risk of perinatal morbidity and mortality. Cervical ripening should be done when labor is induced in women with an unfavorable cervix. If the status

of mother and fetus is stable, CS for induction failure at the latent phase can be avoided by allowing a longer duration of the latent phase (up to 24 hours or longer) and administering oxytocin for at least 12–18 hours after the membrane ruptures before assuming failure induction. Also, efforts must be made to standardize interpretations of fetal heart rate monitoring.[19]

Standardizing protocols, indications, and periodic evaluations of CS indications in each hospital will help lower the CS rate. This will contribute to the reduction in maternal morbidity and mortality and length of hospital stay and in turn improve the family economy. However, a timely and safe CS must be performed with a strong indication. Robson recommends that groups VI, VII, VIII, IX, and X should not be targeted to reduce the level of CS. The relative risk is too high for a reduction in the minimum amount.[10,18,20]

Conclusion

The rate of CS in our center is higher than the optimum rate of CS as recommended by WHO. In both hospitals in this study, the highest rate was found among the age-group of 20–35 years, primigravida, and term pregnancies. The highest contribution to the overall CS rate was from Robson group X in Sanglah Tertiary Hospital and group IV in Sanjiwani District Hospital. Interventions, such as audit feedback, quality improvement, and multifaceted strategies, are effective ways to change clinical practice and reduce the rate of CS. We recommend the use of the Robson classification system as an audit tool in order to enable CS rate reduction strategy to be carried out on certain indications.

Clinical Significance

A safe and timely CS remains a major challenge in countries with a high maternal mortality ratio, which poses new challenges to these countries in reducing CS performed without appropriate indications.

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