



RESEARCH ARTICLE

Comparison of Caesarean Delivery between Two Teaching Hospital in Surabaya Based on the Robson Classification Period of 2023: A Study of Hypertension in Pregnancy Patients

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ABSTRACT

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To compare and analyze caesarean in patients with hypertension in pregnancy at Airlangga University Hospital and dr. M. Soewandhie General Hospital in 2023 based on the Robson classification. This observational analytic study used secondary data from annual maternal reports and medical records of Airlangga University Hospital and dr. M. Soewandhie General Hospital Surabaya during 2023. The Robson classification was applied to the data for further analysis. The CS rate for deliveries with hypertension in pregnancy was 49.3% at Airlangga University Hospital, the highest CS contribution coming from Robson groups 10, 4, and 5 with relative contributions of 28.0%, 18.2%, and 17.4% respectively. At dr. M. Soewandhie General Hospital was 44.1%, with the highest CS contributions coming from Robson groups 5, 4, and 2 with relative contributions of 29.5%, 26.7%, and 16.0% respectively. No noteworthy variance was observed in the CS rate for deliveries with hypertension in pregnancy between the two hospitals (p-value 0.179). The predominant reasons for CS at Airlangga University Hospital were previous CS, severe preeclampsia complications and failed induction of labour, with relative contributions of 21.2%, 17.4%, and 11.4% respectively. At dr. M. Soewandhie General Hospital, the predominant reasons for CS were previous CS, obesity, malpresentation, with relative contributions of 34.5%, 18.1%, and 17.5% respectively. At Airlangga University Hospital, Robson groups 4 and 5 need special attention to reduce the CS rate, meanwhile at dr. M. Soewandhie Hospital was Robson groups 5, 4, and 2. Previous CS was the predominant reason for CS at both hospitals. Further evaluation of the high rate of failed induction in Airlangga University Hospital and further research on the possibility of labor induction in patients with class III obesity in both hospitals is needed.

INTRODUCTION

Labor is the process of expelling the result of conception (baby, placenta, and amniotic membrane) from the uterus through the birth canal or other ways. Caesarean Sections (CS) is an artificial delivery, where the fetus is delivered through an abdominal incision, then an incision in the uterus and CS should only be used if vaginal delivery is not feasible or inadvisable. The increase in the rate of CS continues to occur in Indonesia. Over the last two decades, there has been an increase in CS rates, from 5% to 20%. In Indonesia, the CS delivery rate in the population has exceeded 15%. Besides the CS delivery rate being considered to exceed the WHO's recommended limit, the cost of deliveries covered by BPJS Health since the implementation of the national health insurance (BPJS) in 2014 has consistently ranked at the top for five consecutive years (Ministry of Health RI, 2021). The increase

in CS rates is accompanied by rising maternal and perinatal complications, necessitating monitoring and supervision to reduce unnecessary CS. The method being recommended was the Robson classification (Berghella, 2022; Cunningham et al., 2022; Indonesia, 2018, 2021; Nurhayati et al., 2023; WHO, 2017).

Hypertension in pregnancy is a condition where diastolic blood pressure reaches 90 mmHg or more and/or systolic blood pressure reaches 140 mmHg or more. The estimated global prevalence of hypertension during pregnancy ranges from 2% to 10%, accounting for 18% of maternal fatalities globally. Pregnancy-related hypertension accounts for 9% of maternal mortality in Asia, highlighting the significance of its detection and management. The Robson classification system categorizes all women hospitalized for birth into one of ten categories according to six fundamental obstetric factors. Every woman giving birth in any institution may be categorized into one, and only one, of the ten groups, with no woman is excluded from the classification. The variables assessed are pregnancy history, history of caesarean section, onset of labor, fetal location, number of fetuses, and gestational age. The utilization of the Robson classification is proliferating globally, and notwithstanding few constraints, the categorization is straightforward to use and comprehend (Berghella, 2022; Brown et al., 2018; Cunningham et al., 2022; Melvin & Funai, 2022; Rumintjap et al., 2022).

The Robson Classification is categorized into 10 distinct groups: Group 1 consists of nulliparous women with a single cephalic pregnancy at 37+ weeks who enter spontaneous labor. Group 2 includes nulliparous women with a single cephalic pregnancy at 37+ weeks who either undergo induced labor or deliver via cesarean section (CS) before labor begins. Group 3 comprises multiparous women without a previous uterine scar, with a single cephalic pregnancy at 37+ weeks, who experience spontaneous labor. Group 4 consists of multiparous women without a previous uterine scar, with a single cephalic pregnancy at 37+ weeks, who either undergo labor induction or deliver via CS before labor. Group 5 includes all multiparous women with at least one previous uterine scar and a single cephalic pregnancy at 37+ weeks. Group 6 comprises all nulliparous women with a single breech pregnancy. Group 7 includes all multiparous women with a single breech pregnancy, including those with previous uterine scars. Group 8 covers all women with multiple pregnancies, including those with prior uterine scars. Group 9 consists of all women with a single pregnancy presenting a transverse or oblique lie, including those with previous uterine scars. Finally, Group 10 includes all women with a single cephalic pregnancy under 37+ weeks, regardless of whether they have previous uterine scars (Assefa et al., 2021; Betrán et al., 2014; Boatín et al., 2018; Brunherotti et al., 2023; Budayasa et al., 2022; Kusuma et al., 2022; Mendes & Rattner, 2021; Nakamura-Pereira et al., 2016; Parveen et al., 2021; Robson et al., 2015; Robson, 2001; Senanayake et al., 2019; Show et al., 2023; Sungkar et al., 2019; Torloni et al., 2011; Tura et al., 2018; Vogel et al., 2015; Zeitlin et al., 2021).

OBJECTIVE

This study aims to analyze and compare caesarean deliveries and the factors that affect CS deliveries in patients with hypertension in pregnancy at these two hospitals of the same class according to the Robson classification.

METHOD

This study was observational analytic study used secondary data from annual maternal reports and medical records of patients who delivered at Airlangga University Hospital and dr. M. Soewandhie General Hospital Surabaya from January to December 2023. The Robson classification was applied to the data for further analysis and comparison of caesarean deliveries in patients with hypertension in pregnancy at both hospitals.

RESULTS

From January to December 2023, there were 1165 deliveries at Airlangga University Hospital, with a distribution of 696 (59.7%) cases vaginal delivery and 469 (40.3%) cases CS delivery. While at dr. M. Soewandhie Hospital, a total of 2191 deliveries were obtained, with a distribution of 1322 (60.3%) cases vaginal delivery and 869 (39.7%) cases of CS delivery. The difference of CS rate in Airlangga University Hospital and dr. M. Soewandhie Hospital was not substantial. The CS rate for deliveries of Hypertension in Pregnancy at Airlangga University Hospital and dr. M. Soewandhie Hospital was

39.7% and 49.3% and 44.1% respectively. No substantial variance was observed in the CS rate for deliveries of Hypertension in Pregnancy between the two hospitals (p-value 0.179).

The relative contribution of CS in Robson groups 1 to 5 is higher than in groups 6 to 10 in both hospitals, due to the larger size of groups 1 to 5. The group with the largest CS relative contribution to deliveries with hypertension in Airlangga University Hospital was group 10 with a relative contribution of 28.0%, succeeded by group 4 with 18.2% and group 5 with 17.4%. The largest relative contribution to deliveries with hypertension in pregnancy based on the Robson classification at dr. M. Soewandhie Hospital is group 5 with a relative contribution of 29.5%, succeeded by group 4 with 26.7% and group 2 with 16.0%.

The indications for CS in this study there were 18 indication groups, consist of obesity, previous CS, malpresentation, dystocia, failed induction, severe preeclampsia complications, unfavorable cervix, CPD, macrosomia, fetal distress, maternal parity, multiple pregnancies, HSVB, IUGR, oligohydramnios/polyhydramnios, placenta previa and others. In the obesity group, in this study means CS with indications of obese class III (BMI 40-44.9) or extreme obesity (BMI \geq 45) because if not in labor, patient with obese class III and extreme were delivered through CS (Akbar et al., 2022). The Previous CS, group was all deliveries with previous history of CS, either 1x, 2x or 3x SC. The dystocia group included secondary arrest and arrest of descent. All failed inductions were included in the failed induction group. Patients with severe preeclampsia complications such as impending eclampsia, eclampsia, and pulmonary edema. The unfavorable cervix group included all non-inlabor patients without other complications who were not induced. The fetal distress group included all category II and category III Non-Stress Test abnormalities. The maternal parity group included secondary elderly prime and grande multipara. Multiple pregnancies were equal to gemelli because there were no triplet or quadruplet pregnancies in Airlangga University Hospital or dr. M. Soewandhie Hospital during the study period. Oligohydramnios/Polihdramnios group consisted of oligohydramnios, severe oligohydramnios and polyhydramnios. All placenta previa both marginalis, totalis were comprised in the placenta previa group, and in the miscellaneous group consisted of maternal diseases such as HIV, Pulmonary TB, Uterine Myoma, Hyperthyroid and PROM with fever. The CS indication with the largest CS relative contribution to deliveries with hypertension in pregnancy at Airlangga University Hospital is Previous CS with a relative contribution of 21.2%, succeeded by Severe Preeclampsia complications with 17.4% and failed induction with 11.4% meanwhile at dr. M. Soewandhie Hospital the largest CS relative contribution to deliveries with hypertension in pregnancy is Previous CS with a relative contribution of 34.5%, succeeded by obesity (18.1%) and malpresentation (17.5%).

Table 1. CS Contribution of Patients with Hypertension in Pregnancy Based on Robson Classification at Airlangga University Hospital

| Airlangga University Hospital January to December 2023 | | | | | | |
|--|-------------------|--------------------------|----------------|----------------------|--------------------------------------|--------------------------------------|
| Robson Group | CS on every group | Amount of women in group | Group size (%) | CS rate of group (%) | Absolute contribution to CS rate (%) | Relative contribution to CS rate (%) |
| 1 | 2 | 12 | 4.48% | 16.67% | 0.7% | 1.5% |
| 2 | 22 | 45 | 16.79% | 48.9% | 8.2% | 16.7% |
| 3 | 9 | 33 | 12.31% | 27.3% | 3.4% | 6.8% |
| 4 | 24 | 74 | 27.61% | 32.4% | 9.0% | 18.2% |
| 5 | 23 | 28 | 10.45% | 82.1% | 8.6% | 17.4% |
| 6 | 2 | 2 | 0.75% | 100% | 0.7% | 1.5% |
| 7 | 8 | 8 | 2.99% | 100% | 3.0% | 6.1% |
| 8 | 0 | 0 | 0.00% | 0% | 0.0% | 0.0% |
| 9 | 5 | 5 | 1.87% | 100% | 1.9% | 3.8% |
| 10 | 37 | 61 | 22.76% | 60.7% | 13.8% | 28.0% |
| TOTAL | 132 | 268 | 100% | | 49,3% | 100.0% |

1. Nulliparous women, singleton cephalic pregnancy, gestational age \geq 37 weeks at the time of spontaneous parturition
2. Nulliparous women, singleton cephalic pregnancy, gestational age \geq 37 weeks with induction of labor or SC prior to parturition
3. Multiparous women without previous history of SC, cephalic singleton, gestational age \geq 37 weeks at the time of spontaneous delivery
4. Multiparous women with no prior history of SC, single cephalic, gestational age \geq 37 weeks with induction of labor or SC performed prior to parturition
5. Multiparous women with at least 1 previous history of SC, single cephalic, gestational age \geq 37 weeks
6. Nulliparous women with breech location
7. Multiparous women with breech location (including with previous history of SC)
8. All women with multiple pregnancies (including those with a previous history of SC)
9. All women with transverse or oblique location (including those with a previous history of SC)
10. All women with a singleton cephalic pregnancy $<$ 37 weeks gestation (including those with a previous history of SC)

Table 2. CS Contribution of Patients with Hypertension in Pregnancy Based on Robson Classification at dr. M. Soewandhie Hospital

| RSUD dr. M. Soewandhie Januari sampai Desember 2023 | | | | | | |
|---|-------------------|--------------------------|----------------|----------------------|--------------------------------------|--------------------------------------|
| Robson Group | CS on every group | Amount of women in group | Group size (%) | CS rate of group (%) | Absolute contribution to CS rate (%) | Relative contribution to CS rate (%) |
| 1 | 3 | 50 | 7.8% | 6.0% | 0.5% | 1.1% |
| 2 | 45 | 84 | 13.2% | 53.6% | 7.1% | 16.0% |
| 3 | 14 | 147 | 23.1% | 9.5% | 2.2% | 5.0% |
| 4 | 75 | 154 | 24.2% | 48.7% | 11.8% | 26.7% |
| 5 | 83 | 92 | 14.4% | 90.2% | 13.0% | 29.5% |
| 6 | 5 | 6 | 0.9% | 83.3% | 0.8% | 1.8% |
| 7 | 10 | 14 | 2.2% | 71.4% | 1.6% | 3.6% |
| 8 | 5 | 7 | 1.1% | 71.4% | 0.8% | 1.8% |
| 9 | 6 | 6 | 0.9% | 100% | 0.9% | 2.1% |
| 10 | 35 | 77 | 12.1% | 45.5% | 5.5% | 12.5% |
| TOTAL | 281 | 637 | 100% | | 44.0% | 100% |

1. Nulliparous women, singleton cephalic pregnancy, gestational age \geq 37 weeks at the time of spontaneous parturition
2. Nulliparous women, singleton cephalic pregnancy, gestational age \geq 37 weeks with induction of labor or SC prior to parturition
3. Multiparous women without previous history of SC, cephalic singleton, gestational age \geq 37 weeks at the time of spontaneous delivery
4. Multiparous women with no prior history of SC, single cephalic, gestational age \geq 37 weeks with induction of labor or SC performed prior to parturition
5. Multiparous women with at least 1 previous history of SC, single cephalic, gestational age \geq 37 weeks

6. Nulliparous women with breech location
7. Multiparous women with breech location (including with previous history of SC)
8. All women with multiple pregnancies (including those with a previous history of SC)
9. All women with transverse or oblique location (including those with a previous history of SC)
10. All women with a singleton cephalic pregnancy < 37 weeks gestation (including those with a previous history of SC)

Table 3. Distribution of CS Indications in Each Robson Group for Hypertension Patients in Pregnancy at Airlangga University Hospital

| CS INDICATION | ROBSON GROUP | | | | | | | | | |
|-----------------------------------|--------------|---|---|---|----|---|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Obesity | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 6 |
| Previous CS | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 9 |
| Malpresentation | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 0 | 5 | 0 |
| Dystocia | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Induction Failure | 0 | 6 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 2 |
| Severe Preeclampsia Complications | 1 | 5 | 0 | 4 | 1 | 1 | 1 | 0 | 0 | 10 |
| Unfavorable Cervix | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| CPD | 0 | 1 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 |
| Macrosomia | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Fetal Distress | 1 | 3 | 2 | 1 | 2 | 0 | 1 | 0 | 1 | 1 |
| Maternal Parity | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Multiple Pregnancy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| HSVB | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IUGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oligo/ Polyhydramnios | 0 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 2 |
| Placenta Previa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Others | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |

Table 4. Distribution of CS Indications in Each Robson Group for Hypertension Patients in Pregnancy at dr. M. Soewandhie Hospital

| CS INDICATION | ROBSON GROUP | | | | | | | | | |
|-----------------------------------|--------------|----|---|----|----|---|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Obesity | 0 | 13 | 1 | 21 | 10 | 1 | 0 | 0 | 1 | 4 |
| Previous CS | 0 | 0 | 0 | 0 | 83 | 0 | 2 | 1 | 2 | 9 |
| Malpresentation | 0 | 1 | 0 | 1 | 0 | 5 | 9 | 0 | 5 | 0 |
| Dystocia | 1 | 0 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Induction Failure | 0 | 5 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 1 |
| Severe Preeclampsia Complications | 0 | 4 | 1 | 5 | 1 | 0 | 0 | 0 | 0 | 8 |
| Unfavorable Cervix | 0 | 4 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 |
| CPD | 1 | 4 | 1 | 4 | 4 | 0 | 0 | 0 | 0 | 0 |
| Macrosomia | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Fetal Distress | 0 | 4 | 1 | 4 | 0 | 0 | 0 | 0 | 1 | 4 |
| Maternal Parity | 0 | 0 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 1 |
| Multiple Pregnancy | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 1 |
| HSVB | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IUGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

| | | | | | | | | | | |
|-----------------------|---|---|---|---|---|---|---|---|---|---|
| Oligo/ Polyhydramnios | 0 | 4 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 2 |
| Placenta Previa | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Others | 0 | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |

Table 5. Comparison of CS Indications in patients with Hypertension in Pregnancy at Airlangga University Hospital and dr. M. Soewandhie Hospital

| CS Indication | Unair Hospital | dr. M. Soewandhie Hospital | <i>pValue</i> |
|----------------------------------|----------------|----------------------------|---------------|
| Previous CS | 21.2% | 34.5% | 0.009 |
| Obesity | 9.1% | 18.1% | 0.025 |
| Malpresentation | 8.3% | 7.5% | 0.922 |
| Dystocia | 0.8% | 2.1% | 0.438 |
| Induction Failure | 11.4% | 5.7% | 0.66 |
| Severe Preeclampsia Complication | 17.4% | 6.8% | 0.02 |
| Unfavorable Cervix | 3.8% | 4.3% | 1.00 |
| CPD | 3.8% | 5.0% | 0.785 |
| Macrosomia | 3.0% | 4.3% | 0.737 |
| Fetal Distress | 10.6% | 3.6% | 0.009 |
| Maternal Parity | 1.5% | 3.6% | 0.353 |
| Multiple Pregnancy | 0.8% | 2.5% | 0.445 |
| HSVB | 3.0% | 1.8% | 0.475 |
| IUGR | 0.0% | 0.4% | 1.00 |
| Oligo/ Polyhydramnios | 6.1% | 4.3% | 0.586 |
| Placenta Previa | 1.5% | 1.1% | 0.657 |
| Others | 2.3% | 3.6% | 0.563 |

DISCUSSION

During 2023 there were 1165 deliveries in Airlangga University Hospital with CS rate of 40.3%. This CS rate is slightly higher than the previous study by Zilmi et al which was around 38.9%. The population of patients with Hypertension in Pregnancy at Airlangga University Hospital were 268 cases, representing 23.0% of the maternity patient population. There has been no previous study that recorded the number of maternity patients with Hypertension in Pregnancy at Airlangga University Hospital meanwhile at dr. M. Soewandhie Hospital during 2023 there were 2191 deliveries with CS rate of 39.7%. The population of patients with hypertension in pregnancy at dr. M. Soewandhie Hospital were 637 cases, representing 29.1% of the maternity patient population. No previous studies have recorded the number of maternity patients with hypertension in pregnancy at dr. M. Soewandhie Hospital.

The highest contribution of CS based on Robson classification in Airlangga University Hospital in gnerel population were from Robson group 5, 2 and 4 with relative contribution of 134 cases (28.6%), 87 cases (18.6%) and 68 cases (14.5%) respectively. Robson group 5 are multiparous women with at least 1 previous history of SC, single cephalic pregnancy, gestational age \geq 37 weeks. The high relative contribution of SC deliveries from groups 5,2 and 4 is similar to the study by Zilmi et al using 2019 delivery data (Zilmi et al., 2022). This indicates the large population of deliveries in these three groups in Airlangga University Hospital and the characteristics of patients who delivered in Airlangga University Hospital showed similar characteristics from the previous year. Robson group in labor with hypertension in pregnancy obtained 3 groups with the largest population namely Robson group 4, 2 and 3 with 74 (27.6%) cases, 45 (16.8%) cases and 33 (12.3%) cases respectively. CS rate of hypertension in pregnancy patients at Airlangga University Hospital was 49.3%, with the most common CS contribution based on Robson classification was from group 10, with 37 cases (28.0%), succeeded by group 4 with 24 cases (18.2%) and group 5 with 23 cases (17.4%).

Group 10 consisted of all women with a single cephalic pregnancy $<$ 37 weeks gestation (including those with a history of previous SC), which accounted for the majority of CS patients in hypertension in pregnancy. In this group, most of the population (49%) were patients with Severe Preeclampsia. When assessed in terms of the indication for SC, it was found that the most common indication for SC

in patients with Hypertension in Pregnancy in the Robson 10 group was complications of severe preeclampsia. This condition is in accordance with where in severe preeclampsia patients the recommended termination time is 34 weeks, and in patients with direct complications of severe preeclampsia such as impending eclampsia, eclampsia or pulmonary edema, CS delivery is recommended.

Group 4 were multiparous women with no previous history of CS, single cephalic, gestational age \geq 37 weeks with induction of labor or SC before delivery. When analyzing the indications for SC in Robson group 4 at Airlangga University Hospital, the most common is induction failure. The high rate of failed induction at Airlangga University Hospital may be due to the fact that labor induction was performed with a dose of Misoprostol 25 mcg/6 hours, so it may be less effective than using a dose of Misoprostol 50 mcg/6 hours. A systematic review at the University of Florida Health Science Center, USA compared 5 RCTs (Randomized Controlled Trial) comparing the safety and effectiveness of 25 μ g versus 50 μ g intravaginal misoprostol for cervical ripening and labor induction. Five RCTs met the inclusion criteria for meta-analysis. Odds ratio (OR) with 95% confidence interval (CI). The data showed that intravaginal misoprostol at a dose of 50 μ g for cervical ripening and labor induction is more effective but it is unclear whether the safety is the same as the 25 μ g dose. Tachysystole and hyperstimulation syndrome occurred less frequently in women receiving the 25 μ g dose of misoprostol than the 50 μ g dose (Sanchez-Ramos et al., 2002).

Group 5 contributed the most CS in Airlangga University Hospital. When viewed from the distribution of CS indications in the Robson group, the most common is Previous CS. Group 5 Robson itself is a multiparous woman with at least 1 previous history of SC, single cephalic, gestational age \geq 37 weeks. The high contribution of the Previous CS group in patients with hypertension in pregnancy is because patients with hypertension in pregnancy are limited by the gestational age for termination, namely 34 weeks in Severe Preeclampsia, 37 weeks in Preeclampsia, and 38/39 weeks in Chronic Hypertension and Gestational Hypertension, so if the patient is not in labor at that gestational age, it is not possible to induce labor so it is difficult to expect a VBAC (Edmonds et al., 2016; Figueroa et al., 2023; Gardner et al., 2014; Lundgren et al., 2016; Santoso et al., 2018).

The distribution of cases in hypertension in pregnancy patients at Airlangga University Hospital, out of 268 patients with Hypertension in Pregnancy, the most cases are Gestational Hypertension with 80 cases, succeeded by Preeclampsia with 67 cases and Severe Preeclampsia with 66 cases, while for the contribution of SC, the three largest groups are also from these three classifications, namely Severe Preeclampsia has a relative contribution to SC of 34.85% (46 cases), Gestational Hypertension has a relative contribution to SC of 20.45% (27 cases), and Preeclampsia of 16.67% (22 cases).

The distribution of Robson classification in dr. M. Soewandhie Hospital showed the characteristics of Robson group of patients who delivered in dr. M. Soewandhie Hospital obtained three groups with the largest population who delivered in this hospital are Robson group 3, group 5 and group 4 with total population were 658 (30.00%) cases, 354 (16.16%) cases and 342 (15.97%) cases respectively. The largest CS contribution in the general population based on Robson classification at dr. M. Soewandhie Hospital was from Robson groups 5, 2 and 4 with each relative contribution of 308 cases (35.44%), 171 cases (19.68%) and 112 cases (12.9%). In the hypertension in pregnancy population, the CS contribution was also dominated by Robson groups 5, 4 and 2 with a relative contribution of 83 (29.5%) cases, 75 (26.7%) cases and 45 (16.0%) cases respectively.

Robson group 5 (multiparous women with at least 1 previous history of SC, single cephalic, gestational age \geq 37 weeks) had the highest contribution to SC delivery in RSUD dr. M. Soewandhie, with a sizable group population as well. Robson group 4 (multiparous women with no previous history of SC, single cephalic, gestational age \geq 37 weeks with induction of labor or SC before delivery) was the second highest contributor to SC delivery in hypertension in pregnancy patients at dr. M. Soewandhie Hospital. Robson group 2 consisted of nulliparous women with a single cephalic pregnancy, gestational age \geq 37 weeks with induction of labor or SC before delivery. When viewed from the indication of SC, the most common indication in this group was obesity. Obesity that was included as an indication for SC in this study was class III obesity (BMI 40-44.9 kg/m²) and extreme obesity (BMI \geq 45 kg/m²). In class III obesity and extreme obesity, labor induction was not performed, which led to a high number of CS in Robson groups 2 and 4 at dr. M. Soewandhie Hospital.

Patients with BMI ≥ 40 kg/m². and with a history of CS would be better off with elective repeat CS rather than VBAC. However, the optimal mode of delivery in patients without a history of CS can be considered vaginal. A systematic review in Canada looking at delivery outcomes in patients with BMI ≥ 40 kg/m² who had vaginal delivery and planned cesarean section, showed a lower risk of postpartum hemorrhage in vaginal delivery but with a greater risk of birth trauma to the fetus. In contrast to individuals with a normal body mass index (BMI), obese individuals are at an elevated risk of necessitating cesarean delivery as a result of unsuccessful labor induction, according to a recent meta-analysis of ten cohort studies. They necessitate increased dosages of prostaglandins for cervical ripening, increased quantities of oxytocin for labor induction and augmentation, and a prolonged time to delivery, regardless of whether oxytocin is administered. The rate of unplanned cesarean delivery increased with each BMI category, ranging from 13.9% in those with normal BMI to 21.7% in those with BMI ≥ 40 kg/m², according to another systematic review and meta-analysis of population-based studies consisting of over 3.7 million births (Ashraf et al., 2022).

The relative contribution of CS based on Robson classification in dr. M. Soewandhie Hospital Surabaya in the general population showed that the contribution of CS in Robson groups 1 to 5 was 77.52% higher than Robson groups 6 to 10 at 22.6%, as well as in the hypertension in pregnancy population, the total relative contribution of groups 1 to 5 amounted to 78.2% and in groups 6 to 10 amounted to 21.8%. This is due to the much larger size of groups 1 to 5 representing 83.23% of the delivery population compared to groups 6 to 10 representing only 17.1% of the delivery population. Similarly, in the hypertension in pregnancy population, Robson groups 1 to 5 accounted for 82.7% of the population while Robson groups 6 to 10 accounted for only 17.2% of the population.

Comparison of Robson groups in the general labor population at Airlangga University Hospital was dominated by Robson group 4, group 3 and group 2. In RSUD dr. M. Soewandhie, the general population was mostly from Robson group 3, succeeded by group 5 and group 4. With the contribution of CS in the general population most from group 5 succeeded by group 2 and group 4, and in RSUD dr Soewandhie showed a large contribution of CS from the same three groups namely group 5, 4 and group 2.

The population of labor with hypertension in pregnancy in Airlangga University Hospital is mostly from Robson group 4, 2 and 10, while in dr. M. Soewandhie Hospital from Robson group 4, 3 and 5. For CS contribution, the hypertension in pregnancy population in Airlangga University Hospital is mostly from Robson group 10, 4 and 5 as many as 37 (28%) cases, 24 (18.2%) cases and 23 (17.4%) cases respectively. While in dr. M. Soewandhie Hospital Surabaya, the most common contribution of CS in hypertension in pregnancy patients is from group 5, 4 and 2 respectively as many as 83 (29.5%) cases, 75 (26.7%) cases and 45 (16.0%) cases.

There is a similar group with a high contribution of CS from group 4 in both Airlangga University Hospital and dr. M. Soewandhie Hospital. When viewed from the total population, group 4 is the three largest groups for patients with hypertension in pregnancy in both hospitals. The distribution of hypertension in pregnancy cases based on hypertension in pregnancy classification was found to be similar in both hospital. Both hospitals showed the three largest populations in hypertension in pregnancy in Airlangga University Hospital were Severe Preeclampsia, Preeclampsia and Gestational Hypertension and in dr. M. Soewandhie Hospital, the three most populations were Gestational Hypertension, Preeclampsia and Severe Preeclampsia.

The top three indications for CS in patients with hypertension in pregnancy at Airlangga University Hospital were Previous CS, severe preeclampsia complications and failed Induction with 21.2%; 17.4% and 11.4% respectively. Meanwhile, at dr. M. Soewandhie Hospital, the top three indications were Previous CS, obesity and malpresentation with 34.5%; 18.1% and 7.5% respectively. Of the three most common indications, there was a substantial variance in the indications of Previous CS, obesity and severe preeclampsia complications in both hospitals (pvalue 0.009; 0.025 and 0.02). This shows that Previous CS indication in patients at dr. M. Soewandhie Hospital is very high compared to Airlangga University Hospital. This may be due to the population of hypertension in pregnancy patients with Previous CS in Robson group 5 at Airlangga University Hospital not included among the top three Robson groups. The population of Robson group 5 at Airlangga University Hospital amounted to 28 cases (10.45%), while at dr. M. Soewandhie Hospital the population of Robson group 5 was among the three largest groups in the hypertension in pregnancy population, of total 92 cases

(14.4%). In addition, the CS rate in the hypertension in pregnancy population at Airlangga University Hospital was 82.1% and at dr. M. Soewandhie Hospital was 90.2%. However, patients with Previous CS are not only found in group 5. They can also be found in Robson groups 6 to 10. The VBAC rate in the Previous CS group in the general population at Airlangga University Hospital was 12.3% and in the hypertension in pregnancy population was 9.5% while at dr. M. Soewandhie Hospital, the VBAC rate in the general population was 15.6% and in the hypertension in pregnancy population was 9.4%. The VBAC rate varies across countries, for example 29-36% in Ireland, Italy and Germany, 45-55% in Finland, Sweden and the Netherlands The VBAC rate in Australia in 2006 was around 16.3%, in the USA in 2004 it was 9.2% and in 2006 it dropped to 8.5% (Gardner et al., 2014; Lundgren et al., 2016; Santoso et al., 2018).

This study, when compared with a slightly similar study but only in 1 hospital in Makassar of 156 patients with hypertension in pregnancy who gave birth in an RSIA, which is the first study in Indonesia on Robson's classification of labor with Hypertension in Pregnancy in Indonesia, with a cross-sectional design using secondary data from December 2018 to November 30, 2019. The results showed that the cesarean delivery rate reached 87.8%. According to Robson's classification, the size of group 8 (5.8%), group 10 (9%), and the number of cesarean deliveries in group 5 (90%) were higher (should be 1.5-2%; <5%; and 50-60% in the general population, respectively). All cesarean rates were above the general population, with the most CS contributions from Robson groups 1, 2 and 4 with relative contributions of 19.7%, 16.1% and 16.1% respectively. A limitation of this study in Makassar is that one of the principles of Robson's classification was not implemented, which is that before investigating in more detail in one particular group, it is important to assess the size or size of all 10 groups to ensure the balance and composition of the entire obstetric population (Rumintjap et al., 2022). In this study, we measured the size of each group before analyzing further.

CONCLUSION

CS deliveries at Airlangga University Hospital and dr. M. Soewandhie Hospital in the general population and hypertension in pregnancy population showed CS rates in Robson groups 1 to 5 above Robson's recommendations. Robson groups 1 to 5 are groups that can still be intervened to reduce the CS rate. At Airlangga University Hospital, for the hypertension in pregnancy population, the focus of modification needs to be on Robson group 5 and 4, meanwhile at dr. M. Soewandhie Hospital the focus of modification needs to be on Robson groups 5, 4 and 2. Robson group 5 is quite difficult to modify in the hypertension in pregnancy population because pregnancy termination in hypertension in pregnancy patients was time related, but can be done in the general population. Further evaluation of the high rate of failed induction in Airlangga University Hospital and further research on the possibility of induction of labor in patients with class III obesity in both hospitals is needed. The importance of immediate referral in severe preeclampsia cases is emphasized so that severe conditions due to complications of preeclampsia (impending eclampsia, eclampsia, and pulmonary edema) can be reduced. Continuous monitoring and evaluation are needed to normalize and control SC rates in Indonesia, especially in East Java. It is recommended that similar studies be conducted in other populations to assess the causes of high SC rates in various hospitals.

AUTHOR CONTRIBUTION

E: Collecting and analyzing data, managing research ethics, and drafting the initial manuscript.

MAL: Supervise data collection and analysis process, managing research ethics, revise the manuscript.

BP: supervise data collection and analysis process, managing research ethics, revised the manuscript.

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