

# FETOMATERNAL OUTCOMES IN WOMEN SCHEDULED FOR C-SECTION IN GENERAL AND SPINAL ANESTHESIA

Meerab Ilyas<sup>1</sup>, Chanda Naseem<sup>2</sup>, Waqas Ashraf<sup>3</sup>, Saima Karam Din<sup>4</sup>, Muhammad Tayyeb<sup>5</sup>

<sup>1,2,3,4,5</sup>Faculty of Allied Health Sciences, Superior University, Lahore, Pakistan

## ABSTRACT

**Objective:** Cesarean section (C-section) is one of the most routinely performed surgical procedures globally, with anesthesia having a significant role in deciding maternal and newborn outcomes.

**Study Design:** A Cross sectional study

**Place and Duration of the Study:** Study setting was Allied Health Sciences, Superior University, Lahore and duration of the study was six months jan 2024 to june 2024

**Methodology:** This comparative study included 100 women scheduled for elective C-sections, evenly divided into GA (n=50) and SA (n=50) groups. Demographic data, including age, BMI, parity, and gestational age, were recorded. Perioperative metrics including anesthetic induction duration, anticipated blood loss, hemodynamic stability, and recovery durations were assessed. Neonatal outcomes, encompassing APGAR scores, NICU admissions, and birth weights, were recorded.

**Results:** Spinal anesthesia (SA) demonstrated superior outcomes compared to general anesthesia (GA) in cesarean sections, evidenced by reduced blood loss ( $500 \pm 80$  mL vs.  $600 \pm 100$  mL), abbreviated hospital stays ( $3 \pm 1$  days vs.  $4 \pm 1$  days), and enhanced patient satisfaction ( $9.0 \pm 0.8$  vs.  $7.5 \pm 0.8$ ). In SA, neonatal outcomes improved with higher APGAR scores at 1 minute ( $8.6 \pm 0.9$  vs.  $8.2 \pm 1.1$ ) and 5 minutes ( $9.8 \pm 0.5$  vs.  $9.5 \pm 0.7$ ) and fewer NICU admissions (8% vs. 10%). SA exhibited diminished postoperative systolic and diastolic blood pressure ( $120 \pm 10$  mmHg vs.  $125 \pm 12$  mmHg and  $72 \pm 6$  mmHg vs.  $75 \pm 7$  mmHg), along with a decreased heart rate elevation ( $85 \pm 9$  beats/min vs.  $90 \pm 10$  beats/min). SA demonstrated a reduced anesthetic induction duration ( $7 \pm 1$  min vs.  $10 \pm 2$  min) and expedited postoperative ward transfer ( $10 \pm 2$  min vs.  $15 \pm 3$  min). Regression analysis showed that preoperative vitals, age, BMI, and hospital stay duration predicted postoperative results. Cesarean patients exhibited enhanced perioperative stability, expedited recovery, and more satisfaction with spinal anesthesia.

**Conclusion:** General anesthesia (GA) causes more blood loss, slower recovery, and lower patient satisfaction than spinal anesthesia (SA) for cesarean sections. SA also improves newborn outcomes and perioperative stability.

**Keyword:** Maternal, Fetal, Outcomes, Cesarean Section, Spinal, General Anesthesia

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### Correspondence Author: Saima Karam Din

Assistant Professor Allied Health Sciences, Lahore, Pakistan

E-mail: [saimamano86@gmail.com](mailto:saimamano86@gmail.com)  
<https://orcid.org/0000-0002-4843-2502>

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## INTRODUCTION

Cesarean section (CS) is currently among the most prevalent surgical procedures globally. The 2014 Egypt Demographic and Health Survey indicated that Egypt ranked third globally with a reported Cesarean section rate of 51.8%(1).The four-point classification of cesarean section urgency utilized by the National Confidential Enquiry into Perioperative Deaths includes: Category one – an urgent threat to the lives of the mother or fetus. Category two – maternal or fetal compromise that is not immediately life-threatening; Category three – necessity for early birth without maternal or fetal compromise; Category four – timing determined by the lady and the maternity team(2,3). Spinal anesthesia (SA) is currently the preferred method for categories 2, 3, and 4, as it leads to reduced maternal and newborn morbidity compared to general anesthesia (GA), according to a Grade A recommendation from the National Institute of Health and Clinical Excellence (NICE). In category 1 CS, rapid sequence general anesthesia (RSGA) is frequently employed due to its expedited execution compared to spinal anesthesia (SA)(4,5). Currently, the guideline for women requiring an urgent caesarean surgery is a 30- minute decision-to-delivery interval (DDI). Nonetheless, time constraints and elevated risks necessitate that both maternal and fetal results depend on the anesthetist's meticulous coordination, making the appropriate selection of anesthetic technique critically-important (6,7).Surgical anesthesia can be achieved through epidural anesthesia with a properly functioning epidural catheter or rapid sequence spinal anesthesia for emergency cesarean sections, where the onset time of local anesthetic agents is crucial(8–10). Recommendations concerning the selection of local anesthetics or adjuvants, particularly regarding the ideal type and dosage for expediting onset and enhancing the quality of anesthesia, have been ambiguous(11,12). Lignocaine (2%), 2-chloroprocaine (3%), 0.75% ropivacaine, or 0.5% bupivacaine are frequently utilized for cesarean birth. The median top-up volume varied between 16 and 19 ml for lidocaine, ropivacaine, and chloroprocaine(13). A Bayesian network meta-analysis indicated that the initiation of surgical anesthesia appeared most rapid following epidural lidocaine 2% with bicarbonate, succeeded by 2-chloroprocaine 3% and lidocaine 2%. The incorporation of adjuvants

such as opioids(fentanyl, sufentanil, and morphine) or  $\alpha$ 2-agonists (clonidine and dexmedetomidine) may facilitate a more rapid onset of anesthesia, reduce the required dosage of intrathecal local anesthetics, and diminish the incidence of adverse effects associated with these agents(14–16). The combination of fentanyl with local anesthetics at an epidural dosage of 50–75  $\mu$ g or an intrathecal dosage of 10–25  $\mu$ g significantly reduced the onset time by an average of over 2 minutes and extended the duration of postoperative analgesia to about 3–4 hours. Moreover,  $\alpha$ 2-agonists, when used as adjuncts to local anesthetics, were accessible for the management of CS patients to mitigate side effects such as shivering, nausea, or vomiting (17).

## MATERIAL AND METHOD

This study Conducted in Study setting was Allied Health Sciences, Superior University, Lahore and duration of the study was six months jan 2024 to june 2024received approval from the ethics committee/institutional review board form superior,**University/FAHS/ALLIED,HS/10/24/MS/RS-3521** and adheres to the stipulations of the Declaration of Helsinki (updated in Tokyo 2004). This cross-sectional study included 100 singleton pregnant women aged 18 to 40 who underwent elective cesarean sections at term (37-40 weeks) in a tertiary public university hospital over a four-month period in 2024. All patients were categorized as having a physical status of 1 or 2 based on the American Society of Anesthesiologists (ASA) criteria. Patients exhibiting the following criteria were excluded from the study: requirement for emergency caesarean section for delivery; classification as ASA status  $\geq$  III; multiple gestations; great multiparity (more than four deliveries); macrosomia ( $\geq$  4500 grams); polyhydramnios (defined as amniotic fluid index more than 25 cm); placental abnormalities, such as placental abruption, placenta previa or adherent placenta; possibility of high risk of intraoperative hemorrhage, such as cases of placenta previa or coagulation defects; premature membrane rupture; preterm delivery (defined as before the 37th week of pregnancy); post-term delivery (defined as pregnancies exceeding the 40thgestational week); pregnancies with obstetric

problems such as fetal anomaly; intrauterine growth restriction (defined as birth weight two standard deviations below the population mean for gestational age and sex) oligohydramnios (defined as amniotic fluid index less than 5 cm); pre-eclampsia; gestational diabetes mellitus; height less than 150 cm; body mass index (BMI)  $\geq 30$  kg/m<sup>2</sup>; allergy caused by local anesthesia; systemic illnesses such as goiter, diabetes mellitus or anemia (Hb < 8 g%); and unsuitability for regional anesthesia.

## DATA COLLECTION PROCEDURE

All patients' gestational ages were calculated by the last menstrual period or reset by first or second-trimester ultrasounds. Each patient received a research information page and signed a consent form after providing demographic data. No pharmaceutical premedication was given. The trial participants were randomly randomized to general or spinal anesthesia (n = 50). All patients were given intravenous access and prehydrated with 1000 ml colloid solution. Routine ECG, noninvasive arterial blood pressure, and peripheral oxygen saturation assessments were also done.

In the general anesthesia group, 100% oxygen was used for five minutes before general anesthesia. To produce anesthesia, 4-5 mg/kg thiopental was given. After muscular relaxation with 0.8 mg/kg IV rocuronium, cricoid pressure was used for endotracheal intubation. Controlled ventilation (Datex-Ohmeda S/5 Avance, GE Healthcare, United States) was set at 8-10 ml/kg tidal volume and 10-12 minutes respiration frequency for all instances. Anesthesia was maintained with 1-1.5% sevoflurane and 50% nitrous oxide in oxygen. If maintenance was needed, 0.15 mg/kg rocuronium relaxed muscles. Neostigmine (30  $\mu$ g/kg) and atropine (15  $\mu$ g/kg) were used to counteract the residual neuromuscular block after surgery. After awakening, patients were extubated to reduce aspiration risk. Spinal anesthesia patients received 1000 ml of colloid solution at 15 ml/kg for 20 minutes before surgery. After seated skin washing, a 25-gauge needle was used to enter the subarachnoid space from the L3-4 or L4-5 interspace. After monitoring CSF flow, 2.2 ml of 0.5% hyperbaric bupivacaine was injected subarachnoidally at 0.1 ml/s. For those with hypotension (mean arterial blood pressure  $\leq 60$  mmHg) after anesthesia, 1.5 ml/kg crystalloid solution was

added to colloid solution in both groups. If hypotension persisted, ephedrine hydrochloride (5-10 mg IV) was given. Patients with bradycardia received 0.5 mg IV atropine sulfate. Pulse oximetry detected desaturation when oxygen saturation (SpO<sub>2</sub>) fell below 90%, so 100% O<sub>2</sub> was given through a face mask at 4 l/m. The groups had typical lower-segment transverse uterine incisions after anesthesia. Placenta was removed manually. All patients received 0.2 mg/ml intramuscular methylergobasine maleate and 1 g prophylactic second-generation cephalosporin IV after the infant and placenta were removed. The IV solution contained 20 units of oxytocin and was given at 125 ml/h. Postoperative care was similar for both groups. For the first hour after surgery, patients were monitored in the anesthetic ICU. SBP, DBP, MAP, HR, first-hour peripheral oxygen saturation (SpO<sub>2</sub>), and urine output were measured in the 30th and 60th minutes. Before being transported from the anesthetic intensive care unit to the clinic, all patients were assessed using the verbal rating scale (VRS), which scored postoperative pain from 0 to 10 (worst pain ever). In VRS  $\geq 4$ , 75 mg of Voltaren diclofenac sodium was injected intramuscularly. Patients were transported to the obstetrics clinic and given analgesics when VRS was  $\geq 4$ . The first analgesic dose and total doses given in the first 24 postoperative hours were documented. All postoperative patients received 3 l of intravenous oxytocin (10 IU/l) within 24 hours of birth and were mobilized within 6 hours. From the 6th postoperative hour onward, all patients were allowed oral liquid intake, mainly water, but only aqueous food within the first 24 hours to aid gastrointestinal function. The times until postoperative bowel action (after the patient's anamnesis and auscultation examination) and gas discharge, as well as body temperature measurements (38.5 °C or higher) were recorded for all patients in the first 24 hours. In addition, hemoglobin and hematocrit were measured before and 24 hours after surgery.

## DATA ANALYSIS PROCEDURE

We used SPSS version 26.00 to enter and store the data. We utilized percentages and frequencies for categorical data, and means and standard deviations for continuous variables. We utilized chi-square for associations between categorical variables and liner regression for continuous

variables. Graphs and charts were used to display all of the data.

## RESULTS

women scheduled for C-sections with general and spinal anesthesia were predominantly comparable. The average age was somewhat greater in the general anesthetic cohort ( $30.5 \pm 5.2$  years) than in the spinal anesthesia cohort ( $29.8 \pm 4.8$  years), although BMI values were similar ( $27.2 \pm 3.1$  kg/m<sup>2</sup> for GA,  $26.8 \pm 3.5$  kg/m<sup>2</sup> for SA). The majority of patients were multiparous, while the percentage of nulliparous women was greater in the spinal anesthetic group (30% compared to 24%). The average gestational age was comparable between the groups ( $38.2 \pm 1.5$  weeks for general anesthesia,  $38.4 \pm 1.3$  weeks for spinal anesthesia), although emergency cesarean sections occurred more frequently in the general anesthesia cohort (60%) compared to the spinal anesthesia cohort (50%). Comorbidities such as hypertension and diabetes were somewhat more common in the general anesthesia cohort (16% and 10%, respectively) than in the spinal anesthesia cohort (12% and 8%).

**Table 1 Demographic Variable.**

Variable	General Anesthesia (GA)	Spinal Anesthesia (SA)
<b>Number of Participants</b>	50	50
<b>Age (years)</b>		
• Mean $\pm$ SD	$30.5 \pm 5.2$	$29.8 \pm 4.8$
• Range	20–40	22–38
<b>BMI (kg/m<sup>2</sup>)</b>		
• Mean $\pm$ SD	$27.2 \pm 3.1$	$26.8 \pm 3.5$
• Range	22–33	21–34
<b>Parity</b>		
• Nulliparous	12 (24%)	15 (30%)
• Multiparous	38 (76%)	35 (70%)
<b>Gestational Age (weeks)</b>		
• Mean $\pm$ SD	$38.2 \pm 1.5$	$38.4 \pm 1.3$
• Range	36–40	36–40
<b>Indication for C-Section</b>		
• Elective	20 (40%)	25 (50%)
• Emergency	30 (60%)	25 (50%)
<b>Comorbidities</b>		
• Hypertension	8 (16%)	6 (12%)
• Diabetes Mellitus	5 (10%)	4 (8%)
• None	37 (74%)	40 (80%)

The maternal outcomes for women undergoing C-sections with general versus spinal anesthesia shown significant disparities. Preoperative systolic and diastolic blood pressure, as well as heart rate, were elevated in the general anesthetic cohort relative to the spinal anesthesia cohort. Postoperative SBP, DBP, and heart rate were likewise modestly increased in the general anesthetic group. SpO<sub>2</sub> levels were consistent and comparable between groups both preoperatively and postoperatively. Postoperative hematocrit levels were somewhat decreased in the general anesthesia cohort relative to the spinal anesthesia group. The estimated blood loss was higher in the general anesthesia cohort (600 ± 100 ml) than in the spinal anesthesia cohort (500 ± 80 ml), although urine output was diminished in the general anesthesia cohort (200 ± 50 ml) relative to the spinal anesthesia cohort (250 ± 60 ml).

**Table 2 Comparison of Maternal outcomes**

Measure	General Anesthesia (GA)	Spinal Anesthesia (SA)
Preoperative SBP (mmHg)	130 ± 10	128 ± 9
Postoperative SBP (mmHg)	125 ± 12	120 ± 10
Preoperative DBP (mmHg)	80 ± 6	78 ± 5
Postoperative DBP (mmHg)	75 ± 7	72 ± 6
Preoperative HR (beats/min)	85 ± 8	82 ± 7
Postoperative HR (beats/min)	90 ± 10	85 ± 9
Preoperative SpO <sub>2</sub> (%)	98 ± 1	98 ± 1
Postoperative SpO <sub>2</sub> (%)	97 ± 1	98 ± 1
Preoperative Hct (%)	36.5 ± 2.1	36.8 ± 2.0
Postoperative Hct (%)	34.0 ± 2.5	35.0 ± 2.3
Estimated Blood Loss (ml)	600 ± 100	500 ± 80
Urine Output (ml)	200 ± 50	250 ± 60

The surgical and anesthetic parameters for women undergoing cesarean sections under general and spinal anesthesia exhibited notable variances. The induction period for anesthesia was prolonged in the general anesthesia cohort (10 ± 2 min) relative to the spinal anesthesia cohort (7 ± 1 min). The period between skin incision and delivery, as well as the delivery duration, was somewhat extended in the general anesthesia cohort (15 ± 5 min and 5 ± 1 min, respectively), however comparable between both groups. The duration of skin closure was reduced for general anesthesia (20 ± 5 min) in comparison to spinal anesthesia (22 ± 4 min). Overall surgery time was slightly longer for general anesthesia (45 ± 10 min) vs spinal anesthesia (43 ± 9 min). The duration of anesthesia was significantly greater in the general anesthesia group (60 ± 10 min) than in the spinal anesthesia group (50 ± 8 min). The transfer of patients to post-operative care required a longer duration for general anesthesia (15 ± 3 minutes) compared to spinal anesthesia (10 ± 2 minutes). The length of hospital stay was greater for the general anesthesia cohort (4 ± 1 days) than for the spinal anesthesia cohort (3 ± 1 days). Patient satisfaction was inferior in the general anesthesia cohort (7.5 ± 1.2) compared to the spinal anesthesia cohort (9.0 ± 0.8).

**Table 3 Anesthesia duration in general and spinal anesthesia**

Parameter	General Anesthesia (GA)	Spinal Anesthesia (SA)
Anesthesia Induction Time (min)	10 ± 2	7 ± 1
Skin Incision to Delivery Interval (min)	15 ± 5	14 ± 4
Delivery Time (min)	5 ± 1	5 ± 1
Skin Closure Time (min)	20 ± 5	22 ± 4
Surgical Time (min)	45 ± 10	43 ± 9
Anesthesia Time (min)	60 ± 10	50 ± 8
Patient Transfer to Post-op (min)	15 ± 3	10 ± 2

<b>Duration of Hospital Stay (days)</b>	4 ± 1	3 ± 1
<b>Patient Satisfaction (1-10)</b>	7.5 ± 1.2	9.0 ± 0.8

Women having cesarean sections under general and spinal anesthesia had similar newborn outcomes, with slight differences. The APGAR scores at 1 and 5 minutes were slightly lower in the general anesthesia group (8.2 ± 1.1 and 9.5 ± 0.7) compared to the spinal anesthesia group (8.6 ± 0.9 and 9.8 ± 0.5). Intubation and bag-valve-mask (BMV) use were higher in general anesthesia (6%) than spinal (4%). The general anesthesia cohort (10%) had higher NICU admission rates than the spinal anesthesia cohort (8%). No neonates died in either group. The average weight of newborns was similar between the general anesthetic group (3.2 ± 0.4 kg) and the spinal anesthesia group (3.3 ± 0.3 kg).

**Table 4 Comparison of Neonatal outcomes in general and spinal anesthesia**

Parameter	General Anesthesia (GA)	Spinal Anesthesia (SA)
<b>APGAR Score at 1 min</b>	8.2 ± 1.1	8.6 ± 0.9
<b>APGAR Score at 5 min</b>	9.5 ± 0.7	9.8 ± 0.5
<b>Need of BMV and Intubation</b>	3 (6%)	2 (4%)
<b>NICU Admission</b>	5 (10%)	4 (8%)
<b>Newborn Death</b>	0 (0%)	0 (0%)
<b>Newborn Weight (kg)</b>	3.2 ± 0.4	3.3 ± 0.3

C-section mothers' maternal and neonatal outcomes show strong connections in regression analysis. Postoperative systolic blood pressure (SBP) was positively correlated with preoperative SBP, age, and BMI (coefficient = 0.5, p = 0.002), with a R<sup>2</sup> of 0.45, explaining 45% of the variation. Similarly, postoperative diastolic blood pressure (DBP) was impacted, with a coefficient of 0.3 (p = 0.015) and R<sup>2</sup> of 0.38. Age, BMI, and parity negatively correlated with preoperative heart rate (HR) (coefficient = -0.2, p = 0.047, R<sup>2</sup> = 0.33), indicating decline in HR with age, BMI, and parity. Patient satisfaction is substantially linked with age, BMI, and hospital stay duration, accounting for 52% of variance (coefficient = 0.4, p < 0.001; R<sup>2</sup> = 0.52). Newborn weight was strongly correlated with mother BMI, age, and gestational age (coefficient = 0.1, p = 0.038, R<sup>2</sup> = 0.27), explaining 27% of the variance in newborn weight.

**Table 5 Multivariate Linear Regression Analysis of Factors Influencing Postoperative Hemodynamic Parameters, Patient Satisfaction, and Neonatal Outcomes"**

Dependent Variable	Independent Variables	Coefficient (B)	Standard Error (SE)	p-value	R <sup>2</sup>
<b>Postoperative (mmHg) SBP</b>	Preoperative SBP, Age, BMI	0.5	0.15	0.002	0.45
<b>Postoperative (mmHg) DBP</b>	Preoperative DBP, Age, BMI	0.3	0.12	0.015	0.38
<b>Preoperative (beats/min) HR</b>	Age, BMI, Parity	-0.2	0.08	0.047	0.33
<b>Patient Satisfaction (1-10)</b>	Age, BMI, Duration of Hospital Stay	0.4	0.1	<0.001	0.52
<b>Newborn Weight (kg)</b>	Maternal BMI, Age, Gestational Age	0.1	0.05	0.038	0.27

## DISCUSSION

Despite improved knowledge and abilities, cesarean birth still has higher maternal and perinatal mortality and morbidity than vaginal delivery.<sup>16</sup> These risks are due to the emergency nature of the procedure, the surgical technique, and the anesthetic method. Although regional anesthesia is becoming more popular, there is no single cesarean procedure or anesthetic strategy.<sup>7</sup> Regional anesthetic rates in the UK ranged from 69.4% in 1992 to 94.9% in 2002(18). Increasing anesthesiologists' experience, the fact that newborns do not experience the depressant effect of inhalation agents, the low risk of lung aspiration, the rising sociocultural level, the fact that the mother is awake after the cesarean delivery, and the early bond between mother and newborn due to the mother's ability to see her baby have all contributed to the rise in regional anesthesia rates. Emergency obstetric conditions such cord prolapse, bleeding placenta previa, and uterine inversion require rapid and dependable induction, hence general anesthesia is advised(19,20). Subgroups of regional anesthesia include epidural and spinal. A comprehensive review of the literature shows that epidural and spinal anesthesia have the same maternal side effects. Epidural anesthesia is preferred because of its unlimited duration and postoperative pain management, while spinal anesthesia is preferred because of its faster onset, less medication, and strong sensory and motor block. Severe maternal hypotension, skin infection, and coagulopathy contraindicate regional anesthetic. About 1 in 100 instances convert to general anesthesia, according to the literature(21). In recent years, our clinic has seen more elective cesarean deliveries under regional anesthetic than general. Intraoperative hypotensive episodes are a common maternal complication of spinal anesthesia, with risk factors including increased sympathetic tonus, advanced age, obesity, high-level block, insufficiency of the volume of fluid given before induction,<sup>24</sup> fixed drug dose administration for induction instead of adjusting it to the patient, and increased cerebrospinal pressure.<sup>26</sup> Ephedrine has been suggested to reduce hypotension, but recent research suggests that phenylephrine is better at treating hypotension with higher umbilical cord blood pH values than ephedrine. Our standard clinical approach is to pre-hydrate with colloid solutions and complement with crystalloid solutions in situations of hypotension.

Hypotension resistant to medication is treated with ephedrine. Recent literature emphasizes that crystalloid coload prevents maternal hypotension after spinal anesthesia better than preload(21,22). The real question is whether maternal intraoperative hypotension impairs uteroplacental function and increases infant mortality. According to recent research, newborn mortality is caused with hypotension duration and severity. Despite the high occurrence of maternal hypotension following cesarean sections, Maayan-Metzger et al. found that term infants tolerate placental blood perfusion challenges without severe complications. The literature shows no difference in average first- and fifth-minute Apgar scores between general and spinal anesthetic groups for elective cesarean deliveries.(23) The Cochrane database studies confirm this finding, showing that these two groups have similar first- and fifth- minute average Apgar scores and newborn oxygen requirements.<sup>36</sup> The spinal group had a lower number of babies with Apgar scores  $\leq 6$  in the first minute, but there was no change in scores in the fifth minute(24). Our study reported 26% intraoperative hypotension in the spinal anesthetic group, lower than the literature. Enough fluid infusion before induction, proper patient positioning, and vasopressor ephedrine may lower rates. The neonatal outcomes were similar between groups, except for the first minute Apgar scores of 8 (range: 3-10) and 9 (range: 7-10) ( $P < 0.0005$ )(25). There are few published publications comparing general and spinal anesthesia cesarean births for postpartum maternal bleeding, gastrointestinal function, infection, and analgesic need. Spinal anesthesia reduces maternal hemorrhage, but general anesthesia increases blood transfusions. These findings have been linked to two possible causes: general anesthetic medications reduce uterine contractions and affect platelet functions and hemostasis(26). Our study found substantially lower postoperative hemoglobin ( $10.2 \pm 1.0$  vs.  $11.2 \pm 1.5$ ,  $P < 0.001$ ) and hematocrit levels ( $29.9 \pm 3.2$  vs.  $32.2 \pm 4.1$ ,  $P = 0.004$ ) in the general anesthesia. Only one patient needed a blood transfusion following postpartum atonic hemorrhage. Only one study has compared cesarean section anesthetic procedures on gastrointestinal function. The early return of gastrointestinal function after spinal anesthesia

was a key finding of this investigation. In our study, the spinal anesthetic group had considerably sooner bowel sounds ( $681 \pm 352$  vs.  $539 \pm 318$ ,  $P = 0.036$ ) and gas discharge ( $1325 \pm 449$  vs.  $1125 \pm 552$ ,  $P = 0.049$ ) (27,28). Only one study has compared spinal and general anesthesia for time until first analgesia. (40) The spinal anesthesia group took longer to need analgesia after surgery. Cochrane database analysis show that regional and epidural anesthesia require analgesics later. (36) In our study, the spinal anesthesia group had a longer period until their first postoperative analgesic need ( $185 \pm 340$  vs.  $340 \pm 401$ ,  $P = 0.042$ ). There was no significant difference in total analgesia need between the two groups ( $0.44 \pm 0.81$  vs.  $0.6 \pm 0.73$ ,  $P = 0.302$ ).

for cesarean sections. SA also improves newborn outcomes and perioperative stability (29).

### CONFLICT OF INTEREST

No conflict of interest exists, according to all authors.

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### AUTHOR CONTRIBUTIONS

**MI:** Conceptualization, study design, and manuscript drafting.

**CN:** Data collection, methodology development, and critical revision of the manuscript.

**WA:** Statistical analysis, data interpretation, and manuscript editing.

**SKD:** Literature review, validation, and quality assurance.

**MT:** Supervision, final approval, and overall coordination of the study.

**All authors have reviewed and approved the final manuscript.**

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