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Comparative Analysis of Regional vs. General Anesthesia in Obstetric Surgery: Implications for Practice

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Abstract: Regional anesthesia procedures have been used effectively and safely more than general anesthesia for caesarean sections for many years, but general anesthesia is still necessary in clinical statuses of maternal. This study aimed to assess clinical outcomes of pregnant women who performed obstetric surgeries under both anesthesia (regional versus general). Based on our cross–sectional study, a total of 95 pregnant women who undergone to caesarean delivery under both two anesthesia (regional versus general). The data was divided into two groups based on the type of anesthesia, where the first group involved 65 women under regional anesthesia, while the second group included 30 pregnant women who undergone caesarean section under general anesthesia. All data of pregnant women were collected from medical records at different hospitals in Iraq from March 2024 to March 2025. This study was enrolled clinical outcomes of maternal and neonatal, including post–operative complications, pain scores, and maternal satisfaction. Our findings shown that regional anesthesia had higher success that general anesthesia. This study found pain scores got 2.5 ± 1.2, maternal satisfaction got 45 (69.2%), successful Latch within four h had 48 (73.8%), time to ambulation was 10.2 ± 3.1 hours, length of Hospital stay 3.2 ± 0.6 days, at patients underwent to regional anesthesia than 4.8 ± 1.8 patients underwent to general anesthesia including pain scores got 4.8 ± 1.8, maternal satisfaction got 12 (40.0%), successful Latch within four h had 15 (50.0%), time to ambulation was 16.5 ± 4.8 hours, length of hospital stay 3.5 ± 0.9 days.In comparison with general anesthesia, our study shows that regional anesthesia achieves positive outcomes in both maternal and neonatal outcomes, including rise of recovery rate, pain scores decreased, and improvement of satisfaction rate.

Keywords:. Obstetric surgery; regional anesthesia; general anesthesia; length of stay in hospital; and apgar pain scores.

INTRODUCTION

Caesarean section is when the fetus is born through an incision in the mother's abdomen and uterine wall (Abdallah, M. W. *et al.*, 2014). This requires an effective anesthesia that can be regional (epidural or spinal) or general (Açıkel, A. *et al.*, 2017). With epidural regional anesthesia, the anesthetic is infused into the space around the mother's spine, while with spinal regional anesthesia, the drug is injected in a single dose into the mother's spine. With both types of regional anesthesia, the mother is awake at birth, but numb from the waist down. With general anesthesia, the mother is unconscious during childbirth because the anesthesia affects her entire body. (Afolabi, B. B., & Lesi, F. E. 2012)

In addition to allowing women to decide whether they want to be awake or asleep during caesarean delivery, it is important to know the balance between the beneficial and adverse effects of these different types of anesthesia. This review of trials tried to evaluate these beneficial and harmful effects (Aksoy, H. *et al.*, 2015). There were some differences that favored regional anesthesia, such as less blood loss. The evidence on the differences in pain relief was difficult to evaluate. There were not enough participants to assess the very rare maternal mortality outcome, which may be an important aspect. (Aregawi, A. *et al.*, 2018)

Obstetric anesthesia has some social characteristics that differentiate it from the rest of the specialties. From the outset, we do not refer to the users as patients or sick, but as pregnant women (Arslantas, R., & Umuroglu, T. 2019). On the contrary, pregnancy is a physiological process in which medical incidents, as long as they are not serious, are usually accepted as something inherent to pregnancy (Bakri, M. H. *et al.*, 2015). Childbirth is a foreseen event, so the pregnant woman can inform herself of her situation, plan her development, and actively participate in the management of pregnancy and childbirth, and, in short, she must be able to decide to a large extent how the process will be, which a patient can rarely do during the treatment of his disease. (Bloom, S. L. *et al.*, 2005)

The incidence of Cae Sarean section with respect to vaginal delivery has increased in recent years. In the USA (Caglar, G. S. *et al.*, 2013), the caesarean section has gone from 24% in 2010 to 34% in 2014; in Europe, despite its increase, its incidence does not exceed 15%. In the last year 2014, the

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rate of C-section is 26% in Italy (Chen, Y. *et al.*, 2019), although this figure increases among mothers with previous C-section and those with multiple pregnancies resulting from in vitro fertilization. This progressive increase in caesarean section is accompanied by a decrease in perinatal mortality. (Devroe, S. *et al.*, 2015)

In general, the most frequent causes of caesarean section are dystocias of dilation and progression of labor, and previous caesarean sections, with an incidence of 60% and fetal distress only accounts for 5% of caesarean sections (Dyer, R. A. *et al.*, 2003). Excluding pregnant women with previous pathology, the incidence of maternal death after caesarean section is 5 times higher than after vaginal delivery, and intrapartum caesarean section has a risk of maternal mortality 1.4 times higher than elective caesarean section. Due to regional anesthesia, maternal mortality due to anesthetic causes has decreased. (Edipoglu, I. S. *et al.*, 2018)

PATIENTS & METHODS

Study Design:

We performed a cross-sectional study on 95 maternal who undergone in caesarean section under each of regional and general anesthesia. All data of maternal and neonatal were collected from medical records at different hospitals in Iraq, where these hospitals involved each of the obstetrics and gynecology department, a Neonatal unit, and an Anesthesiology and Intensive Care department during a 1-year follow-up, up ranges from March 2024 to March 2025.

Participants in this study:

We reviewed all medical records of maternal who undergone to caesarean section within obstetrical and anesthesiology at different hospitals in Iraq. This study included only maternal with the following criteria: 1) participants with ages 26 - 36 years, 2) only 28 cases with preeclampsia and gestational diabetes, 3) emergency CS. In contrast, we excluded only maternal with the following criteria: 1) ages who were lower and above this maternal ranged (26 and 36 years, 3) maternal with hemodynamic instability, 4) only diseases included epilepsy, radiculopathies, and cord prolapse.

Data collection:

We enrolled clinical and demographic data of 95 maternal who undergone caesarean section under each of the regional and general anesthesia. We categorized the samples that existed in the data into two groups based on the type of anesthesia. In terms of anesthesia's technique, the first group enrolled only women who underwent to caesarean section under regional anesthesia, which included 65 samples, while general anesthesia involved 30 samples who under general anesthesia. All data were extracted from medical records in the obstetrical and anesthesiology sections. We enrolled demographic data in terms of maternal age, gestational age, body mass index, parity, indication for surgery, and comorbidities such as preeclampsia and gestational diabetes. Also, we determined the clinical outcomes of maternal status at intraoperative status, which measured each of intraoperative hypotension, estimated blood boss, blood loss >1000 ml, need for intraoperative vasopressors, and conversion to general anesthesia. We assessed pain scores of neonatal throughout the Apgar scale at 5 minutes and 7 minutes, alongside with umbilical cord blood gas.

According to post-operative criteria, we measured post-operative complications, satisfaction rate, time to ambulation in hours, time to oral intake, and length of hospital stay of maternal, in correlation with breastfeeding of the neonatal. This study enrolled hospitalization data of maternal after performing caesarean section, including pain score through the VAS scale, which ranged from 0 to 10, where zero is presented as the highest scores of recovery, time to first opioid request, and morphine equivalents during 24 hours. Based on statistical analysis of data, our findings parameters were recorded and analysis by SPSS, version 24.0.

RESULTS

Table 1:- Basics and demographics features of maternal patients who participated in this study.

Characteristic	**RA (n=65)**	**GA (n=30)**	**p-value**
Maternal Age (years), mean ± SD	31.2 ± 4.2	30.6 ± 3.5	0.57
Gestational Age (weeks), mean ± SD	38.4 ± 1.6	37.6 ± 1.7	0.37
Body Mass Index (kg/m²), mean ± SD	32.3 ± 5.6	31.2 ± 4.2	0.59
Parity, n (%)			0.44
Nulliparous	29 (44.62%)	11 (36.67%)	
Multiparous	36 (55.38%)	19 (63.33%)	
Indication for Surgery, n (%)			< 0.01

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Elective Repeat	24 (36.92%)	5 (16.67%)	
Failure to Progress	21 (32.31%)	9 (30%)	
Non-reassuring Fetal Status	12 (18.46%)	13 (43.33%)	
Other (e.g., breech, previa)	8 (12.31%)	3 (10%)	
Comorbidities, n (%)			0.56
Preeclampsia	10 (15.38%)	6 (20%)	
Gestational Diabetes	8 (12.31%)	4 (13.33%)	

Table 2: Enroll intraoperative maternal findings.

Characteristic	**RA (n=65)**	**GA (n=30)**	**p-value**
Intraoperative hypotension	26 (40%)	4 (13.33%)	< 0.02
Estimated blood boss (mL), mean ± SD	788 ± 214	848 ± 284	< 0.1
Blood loss >1000 ml	6 (9.23%)	7 (23.33%)	< 0.1
Need for intraoperative vasopressors	29 (44.62%)	5 (16.67%)	< 0.01
Conversion to general anesthesia	2 (3.08%)	-	-

Table 3: Apgar scores evaluation of neonatal outcomes.

Apgar scores parameters	RA (n=65)	GA (n=30)	p-value
1-minute Apgar Score, median [IQR]	7 [6 – 9]	8 [7 – 9]	< 0.01
1-minute Apgar <7, n (%)	10 (15.38%)	13 (43.33%)	0.20
5-minute Apgar Score, median [IQR]	8 [7 – 9]	8 [7 – 9]	0.15
5-minute Apgar <7, n (%)	3 (4.62%)	6 (20%)	0.11

Table 4:- Identify umbilical cord blood gas of neonatal outcomes.

Parameter	*RA Group*	*GA Group*	*p-value*
Umbilical Artery pH, mean ± SD	7.10 ± 0.05	7.22 ± 0.09	0.05
Umbilical Artery pH <7.10, n (%)	3 (4.6%)	4 (13.3%)	0.23
Umbilical Artery Base Excess, mean ± SD	-3.3 ± 2.3	-4.4 ± 2.9	0.16

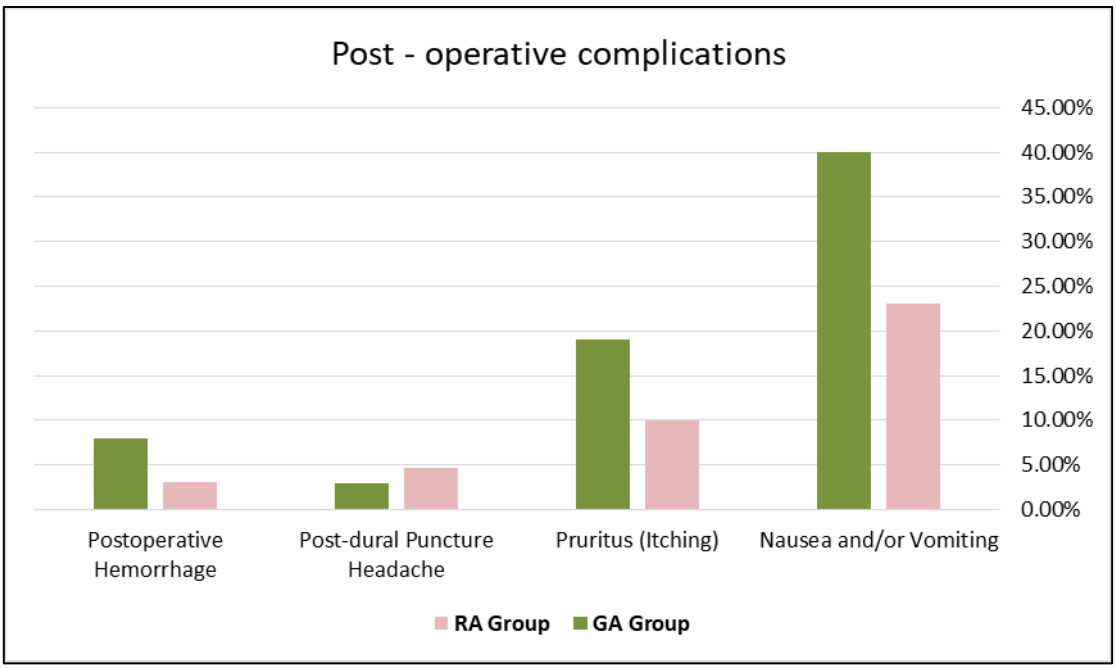

Figure 1: Post–operative complications in the maternal during 24 hours.

Table 5: Assessment post–operative pain scores in participants.

Items	**RA Group**	**GA Group**	**p-value**
Pain Score (VAS 0-10) at six hours	2.5 ± 1.2	4.8 ± 1.8	<0.001
Time to First Opioid Request (hours)	8.2 ± 3.6	3.4 ± 2.2	<0.001
Total Morphine Equivalents (24h)	13.4 ± 8.0	28.6 ± 12.5	<0.001

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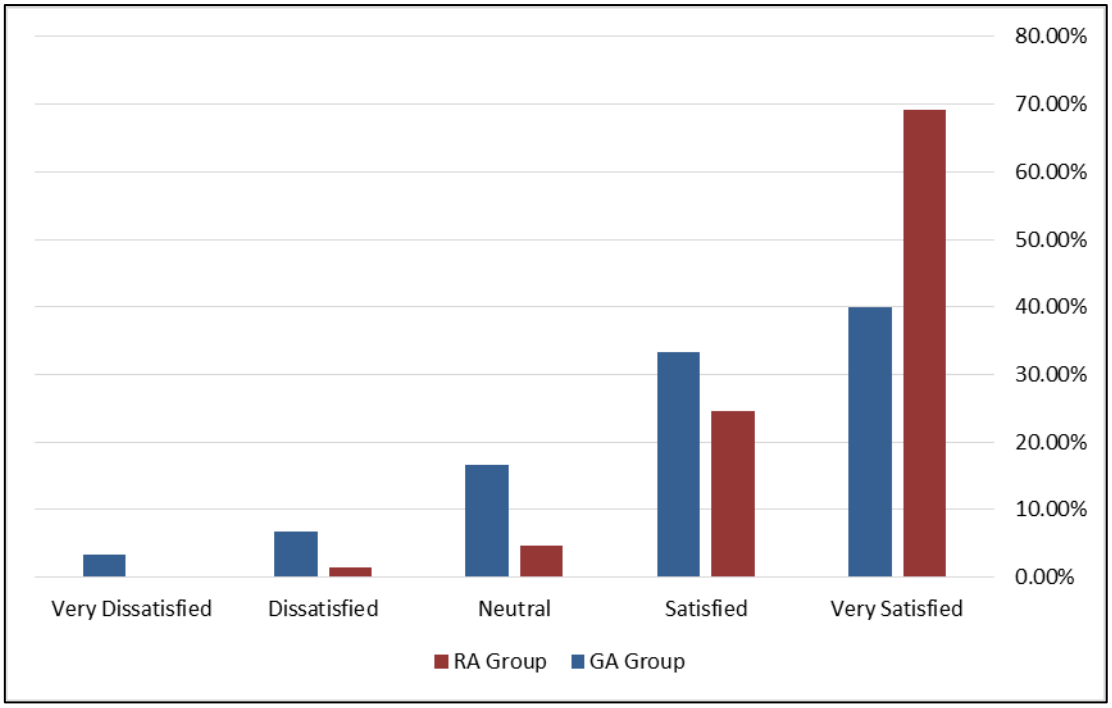

Figure 2: Enroll clinical outcomes of satisfaction rate in the maternal.

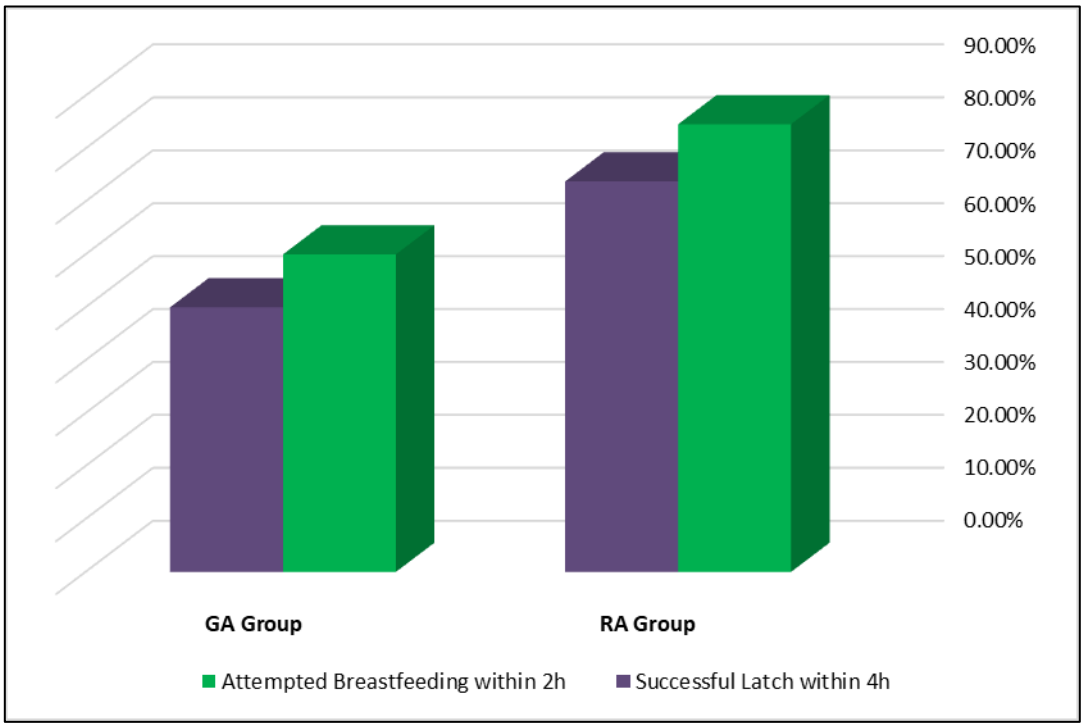

Figure 3: Determining the initial timing of breastfeeding in neonatal.

Table 6:- Hospitalization postoperative recovery.

Parameters	**RA Group**	**GA Group**	**p-value**
Time to Ambulation (hours), mean ± SD	10.2 ± 3.1	16.5 ± 4.8	<0.001
Time to Oral Intake (hours), mean ± SD	5.5 ± 2.0	8.2 ± 3.5	<0.001
Length of Hospital Stay (days), mean ± SD	3.2 ± 0.6	3.5 ± 0.9	0.06

DISCUSSION

In most cases of urgent surgical interventions, especially in CS, regional anesthesia techniques were preferable compared to general anesthesia (Ghaffari, S. *et al.*, 2018). The initiation of regional anesthesia had be limited to achieving a certain degree of cervical dilation; it had been

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initiated taking into account the individual characteristics of the patient, in those clinical situations in which there was a high probability of surgical delivery (multiple pregnancies, preeclampsia, suspected complex intubation, obesity) (Harazima, H. *et al.,* 2019; Havas, F. *et al.,* 2013). This was necessary in order to avoid general anesthesia as much as possible. The technology of regional anesthesia was continuously being improved, which increases the safety of using this method. If before 2000, regional anesthesia was 2.3 times safer than general anesthesia, then after 2000 it was already 16.7 times safer. (Chandler, J. *et al.,* 2019)

In some centers, the time of onset of regional anesthesia still depends on the degree of cervical opening (Jain, K. *et al.,* 2013). At the same time, it has been proven that it is in the first birth that regional anesthesia began earlier at the request of the woman in labor. In the Russian Federation, the number of caesarean section deliveries is increasing every year (Kessous, R. *et al.,* 2012). General anesthesia entails certain risks, including difficult or unsuccessful intubation, aspiration, infectious and thromboembolic complications. That is why regional anesthesia is the method of choice for CS. Currently, there are still difficulties in choosing the most effective method of regional anesthesia, including in the postoperative period. (Khan, Z. H. *et al.,* 2019)

In accordance with our findings, their research found that regional anesthesia had higher first-minute Apgar scores than general anesthesia, with more first-minute Apgar scores below seven reported in the study (Kim, W. H. *et al.,* 2019). In addition, there was not significant distinction among Apgar values at the first and fifth minutes; nevertheless, regional anesthesia was associated with elevated Apgar scores in both times (Craig, S. A. K. 2019). Considering how active the infants were at birth, it is easy to comprehend why there were fewer cases of fetal hypoxia, fetal distress, depressive disorders, and resuscitation during regional anesthetic (Little, S. E. *et al.,* 2016). According to our research, regional anesthesia results in a lesser umbilical artery blood pH (acidic) than general anesthesia. The baby did not have any noticeable side effects from this because there was no respiratory distress, cyanosis, or change in body color. (Madkour, N. M. *et al.,* 2019)

Our results revealed no significant difference for blood loss among regional and general anesthesia as part of the overall maternal outcome (Mancuso, A. *et al.,* 2010). Therefore, unless there's an underlying disease or difficulties that may arise before or after the surgery, individuals who have a regional anesthetic for a caesarean birth are less likely to get a blood transfusion (Nguyen-Lu, N. *et al.,* 2016). Regional anesthetic was linked to a lower incidence of transfusion and surgical blood loss, according to research (Páez, J. J. L., & Navarro, J. R. 2012). Four patients (2%) undergoing general anesthesia had nine units for blood transfusions, according to a Chinese research on low-risk patients. According to some research, spinal & epidural anesthesia frequently resulted in hypotension. (Sabol, B. A., & Caughey, A. B. 2016)

Acute intraoperative hypotension was more prevalent with regional anesthesia, which is in keeping with our findings (Saracoglu, K. T. *et al.,* 2012; Saygı, A. İ. *Et al.,* 2015). It claimed that severe hypotension was caused by the venous pooling and vasodilation impacts of the local anesthetic medications used for regional anesthesia (Shek, N. W. *et al.,* 2012). Additionally, in line with other study, the initial postoperative analgesia demand duration was longer in localized anesthesia, but the postoperative total analgesia intake was higher in general anesthesia (Solangi, S. A. *et al.,* 2019; Staikou, C. *et al.,* 2013; Sumikura, H. *et al.,* 2016; Tsen, L. C., & Kodali, B. S. 2010). Although general anesthesia was linked to discomfort, pain, nausea, & vomiting, among other side effects, patients were happier with regional anesthetic since they could watch the procedure being performed and hear the baby's cries. (Yehuda Ginosar, F. R. *et al.,* 2013)

Based on our findings, we enrolled clinical findings of 95 patients who underwent to caesarean delivery under both two types of anesthesia (regional versus general). Our findings shown maternal age was 31.2 ± 4.2 years, gestational age had 38.4 ± 1.6 weeks, which including nulliparous with 44.62% and multiparous with 55.38%, where the most comorbidities involved preeclampsia with 10 cases and gestational diabetes with 8 cases for maternal in regional anesthesia. In terms of general anesthesia, maternal age was 30.6 ± 3.5 years, gestational age had 37.6 ± 1.7 weeks, which including nulliparous with (36.67%) and multiparous (63.33%, where the most comorbidities involved preeclampsia with 6 cases and gestational diabetes with 4 cases.

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Based on intraoperative data, regional anesthesia found intraoperative hypotension with 40%, estimated blood boss had 788 ± 214 mL, only 6 cases had drop of blood more than 1000 mL, where 29 mothers had need for intraoperative vasopressors, as well as conversion to general anesthesia with 3.08%, while intraoperative hypotension with 4 (13.33%), estimated blood boss had 848 ± 284 mL, only 7 (23.33%) cases had drop of blood more than 1000 mL, where 5 (16.67%) mothers had need for intraoperative vasopressors.

According to post-operative outcomes, all cases had assessment of Apgar pain by the VAS scale. It found that 1-minute Apgar scores <7 had 10 cases and 5-minute Apgar scores <7 had 3 cases for the regional anesthesia group, while 1-minute Apgar scores <7 had 13 cases and 5-minute Apgar scores <7 had 6 cases for the general anesthesia group. Furthermore, umbilical Artery pH <7.10 was observed in 3 cases, and umbilical artery pH was 7.10 ± 0.05 in patients under regional anesthesia, but umbilical Artery pH <7.10 was observed in 4 cases, and umbilical artery pH was 7.22 ± 0.09 in patients under regional anesthesia. Also, this study indicated higher post-operative complications during 24 hours in maternal under general anesthesia than regional anesthesia, where the most factors showed nausea and vomiting with 40%, as well as pruritus (itching) had 19%, while nausea and vomiting with 23%, as well as pruritus (itching) had 10% in regional anesthesia.

Also, we found different levels of post - operative pain score at 6 hours has 2.5 ± 1.2 and total morphine equivalents 13.4 ± 8.0 at 24 hours, as well as all 93.8% of maternal had satisfied /very satisfied, length of hospital stay was 3.5 ± 0.9 days, time to ambulation got 16.5 ± 4.8 hours for maternal under regional anesthesia, while post - operative pain score at 6 hours has 4.8 ± 1.8 and total morphine equivalents 28.6 ± 12.5 at 24 hours, alongside with all 73.3% of maternal had satisfied /very satisfied, length of hospital stay was 3.2 ± 0.6 days, and time to ambulation got 10.2 ± 3.1 hours for maternal under regional anesthesia.

CONCLUSION

Based on clinical outcomes in this cross-sectional study, our results show positive improvement rates for both groups of participating women, whether under general or regional anesthesia, with a high advantage for regional anesthesia. Although general anesthesia remains an important technique for critical clinical cases of mothers and fetuses undergoing caesarean section, regional anesthesia has recorded high improvement rates for both mothers and fetuses in terms of reduced postpartum complications, maternal satisfaction and recovery rates, and positive fetal outcomes.

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