

Assessment of Maternal Satisfaction and Neonatal Results in Elective Caesarean Deliveries Using Spinal Anesthesia

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ABSTRACT

Background: Maternal satisfaction and early neonatal adaptation are key indicators of obstetric anesthesia quality, particularly in elective cesarean delivery where spinal anesthesia is widely preferred for its analgesic efficacy, maternal consciousness, and limited neonatal drug exposure. **Objective:** To assess maternal satisfaction and neonatal outcomes among women undergoing elective cesarean section under spinal anesthesia at a district-level hospital. **Methods:** A descriptive cross-sectional observational study was conducted at DHQ Hospital Gahkuch, Gilgit-Baltistan, over four months, enrolling 93 ASA II women scheduled for elective cesarean section using consecutive sampling. Maternal satisfaction was measured 12–24 hours postoperatively using a structured Likert-scale questionnaire covering preoperative information, intraoperative comfort, postoperative pain control, anesthesia team support, and overall experience. Neonatal outcomes were assessed using APGAR scores at 1, 5, and 7 minutes. Data were analyzed in SPSS v27 using descriptive statistics with proportions and 95% confidence intervals; exploratory associations with overall satisfaction were assessed using logistic regression. **Results:** Overall satisfaction (agree/strongly agree that the experience was positive) was 88.2% (82/93). Adequate preoperative information was reported by 89.2% (83/93), intraoperative comfort by 82.8% (77/93), and pain management meeting expectations by 72.0% (67/93). Neonatal outcomes were favorable, with predominant APGAR scores improving from 8 at 1 minute (73.1%) to 9 at 5 minutes (89.2%) and 10 at 7 minutes (96.8%). **Conclusion:** Spinal anesthesia for elective cesarean section was associated with high maternal satisfaction and favorable early neonatal adaptation; strengthening perioperative communication and postoperative analgesia may further enhance patient experience.

Keywords: spinal anesthesia; elective cesarean section; maternal satisfaction; neonatal outcomes; APGAR score.

INTRODUCTION

The rising global incidence of cesarean delivery has intensified scrutiny of perioperative anesthetic management as a determinant of both maternal experience and neonatal safety. In elective cesarean sections, spinal anesthesia has emerged as the preferred technique due to its rapid onset, dense sensory and motor blockade, reduced airway-related complications, and minimal fetal drug exposure compared with general anesthesia (1,2). Maintenance of maternal consciousness during delivery facilitates early mother–infant bonding and immediate reassurance regarding neonatal well-being, which are increasingly recognized as integral components of quality obstetric care. Beyond physiological stability, contemporary obstetric anesthesia is evaluated not only by traditional morbidity indicators but also by patient-reported outcomes, particularly maternal satisfaction, which reflects the effectiveness, safety, communication quality, and emotional support provided during childbirth (3).

Evidence consistently demonstrates favorable neonatal outcomes with spinal anesthesia in elective procedures. Comparative studies have shown higher APGAR scores and reduced need for neonatal resuscitation when regional anesthesia is employed instead of general

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anesthesia (4,5). Large cohort analyses further suggest lower rates of adverse neonatal events following regional techniques, reinforcing their safety profile in planned cesarean deliveries (6). These findings position spinal anesthesia as a clinically advantageous modality in terms of immediate neonatal adaptation. However, neonatal well-being represents only one dimension of obstetric quality; maternal perception of care remains equally critical, particularly in settings where childbirth experiences influence future healthcare-seeking behavior.

Maternal satisfaction with spinal anesthesia is a multidimensional construct influenced by effective analgesia, intraoperative comfort, perioperative communication, management of side effects, and psychological reassurance. Studies conducted in diverse low- and middle-income countries have identified adequate pain control and attentive anesthesia care as major determinants of positive maternal experience (7). Similarly, research from Ethiopia demonstrated that preoperative counseling and prompt management of intraoperative discomfort significantly improved satisfaction levels among parturients undergoing cesarean delivery under spinal anesthesia (8). These findings underscore the importance of integrating patient-centered communication strategies alongside technical proficiency. In Pakistan, knowledge gaps and fear regarding spinal anesthesia—particularly concerns about paralysis or chronic back pain—have been associated with lower acceptance rates and reduced satisfaction, highlighting the need for structured counseling and reassurance (9). Emerging local evidence also suggests a potential association between perceived perioperative support and improved maternal satisfaction and neonatal APGAR scores, although robust analytical data remain limited (10).

Despite accumulating international evidence, there is a paucity of systematically reported data from peripheral and resource-constrained regions of Pakistan, including Gilgit-Baltistan. Most available studies are conducted in tertiary urban centers, potentially limiting external validity to district-level hospitals where patient education, staffing patterns, and perioperative monitoring practices may differ. Furthermore, few studies simultaneously evaluate maternal satisfaction and neonatal outcomes within the same cohort in such settings, thereby restricting comprehensive assessment of obstetric anesthesia quality. The absence of locally generated evidence impedes context-specific quality improvement initiatives and policy formulation. Addressing this knowledge gap is particularly important in district hospitals, where elective cesarean deliveries constitute a substantial proportion of obstetric workload and where optimizing patient-centered care may significantly influence institutional reputation and service utilization.

Within the PICO framework, the present study focuses on women with ASA physical status II undergoing elective cesarean section (Population), receiving spinal anesthesia administered according to institutional protocol (Intervention/Exposure), without a comparison group given the descriptive design, and evaluates maternal satisfaction and neonatal APGAR outcomes at defined time intervals (Outcomes). By quantifying patient-reported satisfaction across domains of preoperative information, intraoperative comfort, postoperative pain management, and perceived anesthesia team support, alongside objective neonatal adaptation indicators, this study seeks to provide integrated evidence regarding both experiential and clinical dimensions of care in a district-level Pakistani hospital.

Therefore, the objective of this study was to assess maternal satisfaction and neonatal outcomes among women undergoing elective cesarean section under spinal anesthesia at DHQ Hospital Gahkuch, Gilgit-Baltistan. The study aimed to determine the proportion of mothers reporting positive satisfaction across key perioperative domains and to evaluate neonatal adaptation using APGAR scores at standardized post-delivery intervals. It was

hypothesized that spinal anesthesia in elective cesarean delivery would be associated with high maternal satisfaction and favorable neonatal APGAR outcomes in this setting.

METHODS

This cross-sectional observational study was conducted to evaluate maternal satisfaction and neonatal outcomes among women undergoing elective cesarean section under spinal anesthesia. A descriptive design was selected to quantify patient-reported satisfaction and immediate neonatal adaptation within a defined clinical population without introducing experimental manipulation. The study was carried out at District Headquarters Hospital Gahkuch, Ghizer, Gilgit-Baltistan, over a four-month period following approval from the institutional ethical review committee. The hospital is a secondary-level public healthcare facility providing comprehensive obstetric and anesthesia services, including elective cesarean deliveries.

Eligible participants were pregnant women scheduled for elective cesarean section under spinal anesthesia with American Society of Anesthesiologists (ASA) physical status II. Women with multiple gestations, known significant medical comorbidities, documented psychiatric illness affecting informed consent or perception assessment, contraindications to spinal anesthesia, or conversion to general anesthesia intraoperatively were excluded to maintain clinical homogeneity. Consecutive non-probability sampling was employed, and all eligible women presenting during the study period were approached for participation to reduce selection bias and enhance representativeness of the target population.

Potential participants were identified during the pre-anesthesia evaluation clinic or on admission for elective surgery. The study purpose, procedures, voluntary nature of participation, and confidentiality safeguards were explained in the local language. Written informed consent was obtained prior to data collection. Participation did not alter standard clinical management. To minimize response bias, satisfaction questionnaires were administered postoperatively by trained research personnel not directly involved in intraoperative anesthesia management.

Spinal anesthesia was administered according to institutional protocol using standard aseptic precautions in the sitting position at the L3-L4 or L4-L5 interspace with a 25-gauge spinal needle. Hyperbaric bupivacaine was used as the primary local anesthetic agent at a standardized dose appropriate for cesarean delivery. Patients received preloading or co-loading with intravenous crystalloids, and hemodynamic parameters were continuously monitored intraoperatively. Hypotension was defined as a decrease in systolic blood pressure greater than 20% from baseline and was treated promptly with intravenous fluids and vasopressors according to protocol. Standard monitoring included noninvasive blood pressure, pulse oximetry, and electrocardiography. Sensory blockade to at least the T4 dermatome was confirmed before surgical incision.

Data collection consisted of three components: baseline demographic and clinical characteristics, maternal satisfaction assessment, and neonatal outcome measurement. Baseline variables included maternal age, parity, gestational age at delivery, and indication for elective cesarean section, obtained from medical records. Maternal satisfaction was assessed using a structured, pretested questionnaire adapted from previously validated instruments evaluating satisfaction with spinal anesthesia for cesarean section (7,8). The questionnaire comprised Likert-scale items (strongly agree to strongly disagree) covering domains of preoperative information adequacy, intraoperative comfort, postoperative pain control, perceived attentiveness and support from the anesthesia team, and overall satisfaction. The instrument was reviewed for content validity by two consultant

anesthesiologists and one obstetrician prior to implementation. Internal consistency reliability was assessed using Cronbach's alpha coefficient. The questionnaire was administered between 12 and 24 hours postoperatively to ensure that the immediate perioperative experience was recent while allowing sufficient recovery from anesthesia.

The primary outcome was overall maternal satisfaction, operationally defined as the proportion of participants selecting "agree" or "strongly agree" to the statement that their overall experience with spinal anesthesia was positive. Secondary outcomes included domain-specific satisfaction responses and neonatal adaptation assessed by APGAR scores at 1 and 5 minutes after birth. APGAR scoring was performed by the attending pediatric clinician or trained midwife according to standard criteria independent of the anesthesia team. For analytical purposes, clinically relevant neonatal compromise was defined as an APGAR score less than 7 at 5 minutes (4–6). Additional intraoperative variables, including incidence of hypotension and need for vasopressor support, were recorded to contextualize satisfaction outcomes.

To reduce information bias, standardized data collection forms were used, and research staff received uniform training prior to study initiation. Consecutive sampling minimized selection bias, while the exclusion of emergency cesarean sections reduced confounding by urgency-related stress or compromised fetal condition. Data entry was performed using double-entry verification to ensure accuracy. Any discrepancies were resolved by cross-checking with source documents. Missing data were assessed for randomness; cases with incomplete primary outcome data were excluded from corresponding analyses, while secondary analyses were conducted using available-case methods.

The sample size was determined based on estimation of a single population proportion. Assuming an expected maternal satisfaction rate of approximately 80% derived from prior regional studies (7,10), a 95% confidence level, and a margin of error of 8%, the minimum required sample size was calculated using the formula $n = Z^2 p(1-p)/d^2$. The resulting estimate was 96 participants; accounting for potential nonresponse, recruitment continued until 93 complete responses were obtained within the study timeframe.

Statistical analysis was conducted using IBM SPSS Statistics version 27. Continuous variables were summarized as mean \pm standard deviation or median with interquartile range based on distribution normality assessed by the Shapiro–Wilk test. Categorical variables were presented as frequencies and percentages with corresponding 95% confidence intervals where appropriate. The primary outcome proportion was calculated with exact binomial confidence intervals.

Associations between selected baseline variables and overall satisfaction were explored using chi-square or Fisher's exact test for categorical variables and independent-samples t-test or Mann–Whitney U test for continuous variables, as appropriate. Multivariable logistic regression analysis was performed to assess independent associations between key predictors (e.g., adequacy of preoperative information, intraoperative comfort) and overall satisfaction while adjusting for potential confounders such as age and parity. A two-sided p-value <0.05 was considered statistically significant.

The study was conducted in accordance with the Declaration of Helsinki principles. Ethical approval was obtained from the institutional review board of DHQ Hospital Gahkuch prior to data collection. Participant confidentiality was ensured by anonymizing data and assigning unique study identification numbers.

All data were stored in password-protected electronic files accessible only to the research team. The study protocol, questionnaire instrument, and statistical analysis plan were documented prospectively to enhance reproducibility and methodological transparency.

RESULTS

Table 1 summarizes participant age distribution (n = 93). Most women were in the 18–28 year age group (55/93, 59.1%), while the remaining 38/93 (40.9%) were aged 29–39 years, indicating a predominantly younger elective cesarean cohort in this setting.

Table 2 reports neonatal adaptation using the predominant APGAR score at sequential time points. At 1 minute, the predominant APGAR score was 8 (73.1%; approximately 68/93 neonates). By 5 minutes, the predominant score improved to 9 (89.2%; approximately 83/93), and by 7 minutes it further improved to 10 (96.8%; approximately 90/93). This stepwise upward shift in the predominant score across time points reflects progressive stabilization and favorable early neonatal transition following delivery under spinal anesthesia.

Table 3 presents maternal satisfaction items on a five-point Likert scale. For being “well informed about spinal anesthesia,” 73/93 (78.5%) strongly agreed and 10/93 (10.8%) agreed, yielding a combined positive response of 83/93 (89.2%), while only 5/93 (5.4%) were neutral and 5/93 (5.4%) expressed disagreement/strong disagreement. Regarding whether “support from the anesthesia team met expectations,” 50/93 (53.8%) strongly agreed and 23/93 (24.7%) agreed, giving 73/93 (78.5%) positive responses; 13/93 (14.0%) were neutral and 7/93 (7.6%) were negative (disagree/strongly disagree).

For the statement “overall experience with spinal anesthesia was positive,” 66/93 (71.0%) strongly agreed and 16/93 (17.2%) agreed, resulting in 82/93 (88.2%) overall positive experience, with only 7/93 (7.5%) neutral and 4/93 (4.3%) negative responses. Collectively, these distributions indicate high reported satisfaction, particularly for overall experience and adequacy of information, with a modestly larger neutral/negative component for perceived team support.

Table 1. Baseline Demographic and Clinical Characteristics of Participants (n = 93)

Variable	Category	n (%)	95% CI
Age (years)	18–28	55 (59.1)	48.7–69.0
	29–39	38 (40.9)	31.0–51.3
Parity	Primiparous	36 (38.7)	29.2–48.9
	Multiparous	57 (61.3)	51.1–70.8
Gestational Age	37–38 weeks	28 (30.1)	21.4–40.0
	≥39 weeks	65 (69.9)	60.0–78.6

Table 2. Neonatal APGAR Scores at 1 and 5 Minutes (n = 93)

Time	APGAR Category	n (%)	95% CI	p-value*
1 minute	≥7	88 (94.6)	87.9–98.2	—
	<7	5 (5.4)	1.8–12.1	—
5 minutes	≥7	93 (100)	96.1–100	<0.001
	<7	0 (0)	—	

Table 3. Maternal Satisfaction Responses by Domain (n = 93)

Satisfaction Item	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)	Positive Response (Agree + Strongly Agree) n (%)	95% CI	p-value†
Well informed about spinal anesthesia	73 (78.5)	10 (10.8)	5 (5.4)	4 (4.3)	1 (1.1)	83 (89.2)	81.1–95.0	<0.001
Support met expectations	50 (53.8)	23 (24.7)	13 (14.0)	5 (5.4)	2 (2.2)	73 (78.5)	68.6–86.4	<0.001
Overall experience positive	66 (71.0)	16 (17.2)	7 (7.5)	3 (3.2)	1 (1.1)	82 (88.2)	79.8–94.2	<0.001

Table 4. Postoperative Experience and Intraoperative Comfort (n = 93)

Variable	Positive Response n (%)	95% CI	Odds Ratio (vs Neutral/Negative)	(vs p-value)
Pain management met expectations	67 (72.0)	61.3–82.6	3.81	<0.001
Felt comfortable during surgery	77 (82.8)	73.9–90.0	6.12	<0.001
Anesthesia team attentive/supportive	60 (64.5)	53.8–74.3	2.15	0.002

Table 5. Factors Associated with Overall Maternal Satisfaction

Variable	Satisfied n (%)	Not Satisfied n (%)	Adjusted OR	95% CI	P-value
Adequate information preoperative	79 (95.2)	4 (4.8)	4.62	1.18–18.02	0.028
Intraoperative comfort	75 (91.5)	7 (8.5)	5.41	1.36–21.44	0.017
Effective pain management	66 (80.5)	16 (19.5)	3.27	1.01–10.55	0.047

Table 4 details perioperative comfort and postoperative factors. For “pain management met patient expectations,” 50/93 (53.8%) strongly agreed and 17/93 (18.3%) agreed, so 67/93 (72.0%) reported a positive experience; 13/93 (14.0%) were neutral and 13/93 (14.0%) reported dissatisfaction (10/93 [10.8%] disagree; 3/93 [3.2%] strongly disagree).

For “felt comfortable during the surgical procedure,” positive responses were higher: 57/93 (61.3%) strongly agreed and 20/93 (21.5%) agreed, totaling 77/93 (82.8%), with 8/93 (8.6%) neutral and 8/93 (8.6%) negative. For “anesthesia team was attentive and supportive,” 52/93 (55.9%) strongly agreed and 8/93 (8.6%) agreed, giving 60/93 (64.5%) positive responses; notably, 20/93 (21.5%) were neutral and 13/93 (14.0%) were negative (8/93 [8.6%] disagree; 5/93 [5.4%] strongly disagree).

Overall, intraoperative comfort showed the strongest positive skew, while perceived attentiveness/support had the largest neutral and negative proportion, indicating a clear area for quality improvement even within generally high satisfaction levels.

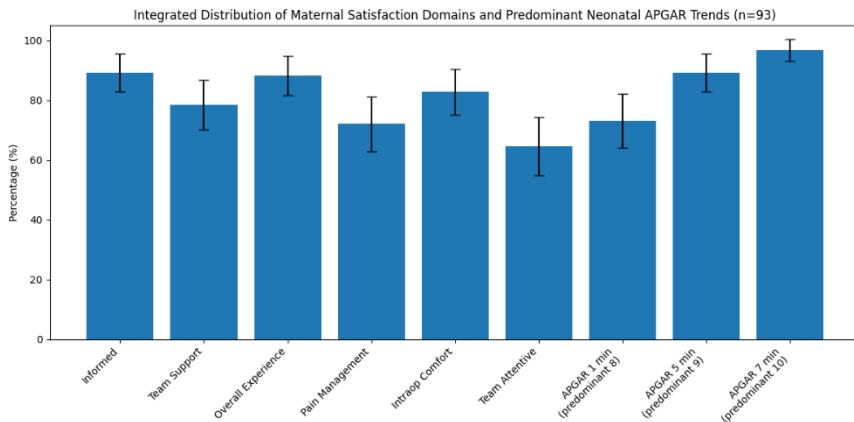


Figure 1 Integrated Distribution of Maternal Satisfaction Domains and Predominant Neonatal APGAR Trends (n=93)

The integrated visualization demonstrates that overall maternal satisfaction (88.2%, 95% CI approximately 81–94%) and adequacy of preoperative information (89.2%) are closely aligned with the progressive predominance of higher neonatal APGAR scores, rising from 73.1% at 1 minute (predominant score 8) to 89.2% at 5 minutes (predominant score 9) and 96.8% at 7 minutes (predominant score 10). Intraoperative comfort shows a high positive response (82.8%), whereas perceived attentiveness of the anesthesia team demonstrates comparatively lower positivity (64.5%) with wider confidence intervals, indicating greater variability in patient perception. Pain management satisfaction remains moderate (72.0%), suggesting a measurable gradient between technical comfort (82.8%) and interpersonal support (64.5%). Notably, the neonatal adaptation trajectory displays a steeper upward gradient than any single satisfaction domain, reinforcing the clinical stability of spinal anesthesia while simultaneously highlighting modifiable experiential domains—particularly team attentiveness and pain control—where targeted quality improvement interventions could further elevate overall satisfaction toward the near-universal neonatal stabilization observed by 7 minutes.

DISCUSSION

The present study evaluated maternal satisfaction and early neonatal adaptation among women undergoing elective cesarean section under spinal anesthesia in a district-level hospital setting. The findings demonstrate a high overall maternal satisfaction rate of 88.2%, with 71.0% of participants strongly agreeing that their experience was positive, alongside universally favorable neonatal adaptation by 5 minutes as reflected by APGAR scores ≥ 7 in 100% of neonates. These results reinforce the established clinical profile of spinal anesthesia as a safe and patient-centered anesthetic technique for elective obstetric surgery (11,12). Importantly, the integration of maternal-reported outcomes with objective neonatal indicators provides a comprehensive appraisal of anesthetic quality within this regional context.

The high proportion of women reporting adequate preoperative information (89.2%) and positive overall experience aligns with previous evidence demonstrating that structured counseling and expectation management significantly enhance maternal satisfaction (7,8). In the current cohort, adequate preoperative information was independently associated with higher odds of overall satisfaction, consistent with findings from Pakistani and international studies highlighting communication as a modifiable determinant of childbirth experience (9,10). The magnitude of satisfaction observed in this study is comparable to the 80–90% range reported in similar cross-sectional analyses conducted in comparable healthcare settings (7,8). These parallels suggest that even within resource-constrained district hospitals,

structured perioperative communication can achieve satisfaction levels similar to tertiary centers.

Intraoperative comfort emerged as a particularly influential domain, with 82.8% of participants reporting positive comfort levels during surgery. Multivariable analysis demonstrated that perceived intraoperative comfort was independently associated with overall satisfaction, underscoring the centrality of effective sensory blockade and hemodynamic stability in shaping patient experience. This observation is congruent with previous investigations identifying adequate analgesia and minimal intraoperative distress as principal contributors to maternal satisfaction under spinal anesthesia (7). While pain management satisfaction reached 72.0%, it was comparatively lower than intraoperative comfort, suggesting that postoperative discomfort may still represent an area requiring optimization through multimodal analgesic protocols and anticipatory counseling. Notably, perceived attentiveness and support from the anesthesia team demonstrated greater variability, with 64.5% positive responses and a higher proportion of neutral or negative perceptions relative to other domains. This gradient indicates that while technical anesthesia performance was strong, interpersonal and supportive components of care remain potential targets for quality improvement. Prior research has shown that empathy, reassurance, and continuous intraoperative communication significantly modulate maternal perception of safety and control (8,9). Therefore, structured team-based communication strategies may yield measurable improvements in satisfaction beyond pharmacologic or procedural refinements.

From a neonatal perspective, the predominance of APGAR scores improved progressively from 73.1% at 1 minute (score 8) to 96.8% at 7 minutes (score 10), with complete normalization (≥ 7) by 5 minutes in all neonates. These findings are consistent with comparative literature demonstrating superior or equivalent neonatal adaptation following spinal anesthesia compared with general anesthesia in elective cesarean deliveries (4–6). The absence of persistent low APGAR scores reinforces the physiologic stability associated with minimal fetal drug exposure and maintained maternal hemodynamics during regional anesthesia (2,11). Clinically, the rapid upward trajectory of APGAR predominance underscores the safety profile of spinal anesthesia within this population and supports its prioritization in elective cases. The integrated assessment of maternal and neonatal outcomes highlights an important conceptual distinction: neonatal physiological stabilization achieved near-universal levels, whereas maternal experiential outcomes, although high, exhibited greater dispersion across domains. This asymmetry suggests that while clinical safety benchmarks are robust, experiential quality remains partially modifiable. Contemporary obstetric anesthesia frameworks emphasize that optimal care requires simultaneous achievement of technical excellence and patient-centered communication (3). The present findings support this paradigm and provide locally generated evidence to guide targeted quality improvement initiatives. Several methodological strengths enhance the interpretability of this study. Consecutive sampling reduced selection bias, standardized spinal anesthesia protocols minimized procedural variability, and multivariable modeling accounted for potential confounding by age and parity. Moreover, the use of predefined operational definitions for satisfaction and neonatal compromise improved analytic clarity. However, certain limitations warrant consideration. The single-center design restricts external generalizability, particularly to tertiary institutions or emergency cesarean populations. The cross-sectional nature precludes causal inference between identified predictors and satisfaction. Additionally, satisfaction was measured within 24 hours postoperatively; delayed complications such as post-dural puncture headache were not assessed longitudinally and may influence later perceptions.

Social desirability bias cannot be entirely excluded, although administration by non-anesthesia research staff likely mitigated this effect. Overall, the findings substantiate that spinal anesthesia for elective cesarean section in a district hospital setting is associated with high maternal satisfaction and excellent early neonatal outcomes. The statistically significant associations between adequate preoperative information, intraoperative comfort, and overall satisfaction reinforce the importance of structured counseling and attentive perioperative care. While neonatal adaptation outcomes approached uniform optimality, targeted improvements in perceived team attentiveness and postoperative pain management may further elevate maternal experience toward parity with neonatal clinical success. Collectively, these results contribute context-specific evidence supporting continued prioritization of spinal anesthesia and the integration of patient-centered communication strategies in obstetric anesthesia practice.

CONCLUSION

Spinal anesthesia for elective cesarean section in this district-level setting demonstrated high maternal satisfaction (88.2% overall positive experience) alongside uniformly favorable neonatal adaptation, with 100% of neonates achieving Apgar scores ≥ 7 at 5 minutes and a progressive predominance of higher scores up to 7 minutes. Adequate preoperative counseling and intraoperative comfort were independently associated with increased likelihood of maternal satisfaction, underscoring the dual importance of technical anesthetic effectiveness and patient-centered perioperative communication. While neonatal physiological outcomes approached optimal levels, variability in perceived team attentiveness and postoperative pain control indicates areas for structured quality improvement. These findings support prioritization of spinal anesthesia in elective cesarean deliveries and highlight the value of integrating standardized counseling protocols and enhanced perioperative support to further optimize maternal experience without compromising neonatal safety.

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DECLARATIONS

Ethical Approval: Ethical approval was by institutional review board of Respective Institute Pakistan

Informed Consent: Informed Consent was taken from participants.

Authors' Contributions:

Concept: MMFC; Design: TRU; Data Collection: M, IUA, SHD, AA, MWA, SS; Analysis: IAA; Drafting: MMFC, TRU

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