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ORIGINAL ARTICLE

Comparative Study of Vaginal Delivery and Cesarean Section on Maternal Recovery Time

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ABSTRACT:

Background: Vaginal delivery and cesarean section are the two principal modes of childbirth, each with distinct implications for maternal recovery. While cesarean section (CS) is often a lifesaving intervention, it involves surgical trauma, greater postoperative discomfort, and prolonged hospitalization compared to vaginal delivery. Evaluating maternal recovery in both modes provides insight into optimizing postpartum care and guiding clinical decision-making in obstetric practice. **Aim:** This study aimed to compare maternal recovery parameters between vaginal delivery and cesarean section, focusing on recovery time, pain intensity, postoperative complications, and maternal satisfaction in women delivering at a tertiary care hospital. **Material and Methods:** A comparative observational study was conducted on 84 women, equally divided into two groups—Group A (vaginal delivery) and Group B (cesarean section)—after obtaining ethical approval and informed consent. Inclusion criteria comprised term singleton pregnancies in women aged 18–40 years without preexisting medical disorders or obstetric complications. Maternal recovery was assessed using parameters such as time to ambulation, oral intake, bowel movement, duration of hospital stay, pain scores (VAS at 12, 24, and 48 hours), postpartum blood loss, complications, and maternal satisfaction. Data were analyzed using SPSS version 16.0, with t-test and Chi-square test, and $p < 0.05$ considered statistically significant. **Results:** Vaginal delivery demonstrated significantly faster recovery with earlier ambulation (5.42 ± 1.27 h) and oral intake (3.26 ± 0.92 h) compared to cesarean section (15.76 ± 3.54 h, 9.38 ± 2.15 h, $p < 0.001$). Hospital stay was shorter (2.64 ± 0.71 days vs 6.14 ± 1.23 days, $p < 0.001$), and bowel function returned earlier (9.48 ± 2.36 h vs 17.52 ± 3.89 h, $p < 0.001$). Pain scores were significantly lower at all intervals after vaginal delivery ($p < 0.001$). Blood loss and hemoglobin drop were greater in the cesarean group (581.36 ± 102.17 mL, post-Hb 9.84 ± 1.02 g/dL) than in vaginal delivery (312.48 ± 76.25 mL, post-Hb 10.96 ± 0.91 g/dL, $p < 0.001$). Postpartum complications such as wound infection (14.28%) and fever (16.67%) were more common after CS. Maternal satisfaction and emotional well-being were higher among vaginal delivery women (85.71% and 88.09%) compared to cesarean patients (52.38% and 57.14%, $p < 0.05$). **Conclusion:** Vaginal delivery was associated with significantly faster recovery, less pain, fewer complications, and greater maternal satisfaction than cesarean section. Cesarean section, though essential when indicated, prolongs recovery and increases postoperative morbidity, underscoring the importance of judicious use and enhanced postoperative care.

Keywords: Vaginal delivery, Cesarean section, Maternal recovery, Postpartum complications

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INTRODUCTION

Childbirth remains one of the most common reasons for hospital admission worldwide, and the route of deliveryvaginal birth or cesarean sectionhas profound implications for a mother's early recovery, health service use, and overall experience of care. Over recent decades, cesarean section (CS) rates have risen in many regions, driven by a complex interplay of clinical, organizational, medicolegal, and sociocultural factors. While CS can be lifesaving when medically indicated, the procedure is major abdominal surgery and is consistently associated with greater perioperative morbidity and longer convalescence than uncomplicated vaginal birth. Against this backdrop, a focused comparison of maternal recovery time after vaginal delivery versus CS is clinically relevant for counseling, quality improvement, and service planning. It also aligns with global guidance underscoring that CS should be available to all who need it, but not performed without indication.[1]Population-level analyses emphasize the variability and steady upward trajectory of CS use. Early global estimates showed wide differences in national and regional CS proportions, reflecting disparities in access, case-mix, and practice patterns.[2] Understanding this variability is important because mode of birth is not merely a surgical choice—it shapes postoperative recovery milestones such as time to ambulation and oral intake, bowel function, analgesic needs, duration of hospitalization, and readiness for infant care and breastfeeding. By centering on standardized, patient-centered recovery metrics, comparative studies can move beyond crude utilization rates to illuminate the real-world consequences for mothers.Professional guidelines complement this perspective by codifying best practices that influence recovery. The National Institute for Health and Care Excellence (NICE) guidance on CS highlights perioperative strategies—such as neuraxial anesthesia, multimodal analgesia,

early oral intake, and thromboprophylaxis—that aim to reduce complications and hasten return to function.[3] These recommendations anticipate tangible differences in early mobility, pain trajectories, bowel recovery, and length of stay when comparing CS with vaginal birth, even in uncomplicated cases. They also frame recovery as a continuum that begins intrapartum and extends into the postnatal period, reinforcing why comparable groups and clearly defined outcomes are essential in research.A related practice issue is cesarean delivery on maternal request, which has prompted specific guidance because it may expose women without medical indications to the inherent risks of surgery and potentially longer recovery. The American College of Obstetricians and Gynecologists (ACOG) advises comprehensive counseling that includes discussion of postoperative pain, delayed functional recovery, and the implications for future pregnancies, where cumulative CSs increase risks such as placenta previa and accreta.[4]In the context of recovery-time research, this underscores the ethical imperative to generate robust, patient-relevant data that can inform shared decision-making before a first birth.Observational evidence comparing outcomes after planned vaginal birth and CS generally finds higher short-term maternal morbidity with CS—differences that translate into longer inpatient stays and slower return to baseline activity. A population-based Nova Scotia cohort demonstrated increased composite morbidity in women undergoing cesarean without labor compared with those experiencing spontaneous labor at term, even after accounting for key confounders.[5] Although such studies differ in design and outcome definitions, they consistently suggest that the surgical course carries additional burdens that are meaningful to mothers and health systems. Recovery-time endpoints, therefore, are not surrogate curiosities but practical measures that reflect the lived postoperative experience.Prevention of infectious morbidity is central to optimizing recovery after CS. High-quality evidence supports prophylactic antibiotics to reduce endometritis and wound infections—complications that predictably prolong hospitalization, delay ambulation, and worsen pain. A Cochrane review concluded that routine antibiotic prophylaxis at CS substantially lowers infectious outcomes compared with no prophylaxis, reinforcing why standardized perioperative protocols are a cornerstone of enhanced recovery.[6],[7] Even with best practices, however, the residual risk of infection after CS exceeds that after straightforward vaginal birth, and this differential contributes to the aggregate recovery-time gap between modes.

MATERIAL AND METHODS

This comparative observational study was conducted at a tertiary care hospital and included a total of 84 patients who delivered either vaginally or by cesarean section. All participants were selected from the obstetrics and gynecology department after obtaining informed consent. Ethical clearance was obtained from the institutional ethical committee prior to initiation of the study. The inclusion criteria comprised women aged between 18 to 40 years with singleton pregnancies who delivered at term (37–42 weeks of gestation). Exclusion criteria included patients with preexisting medical disorders such as diabetes mellitus, hypertension, thyroid disease, anemia, or those with complicated pregnancies (e.g., preeclampsia, eclampsia, placenta previa, abruptio placentae, or fetal anomalies).

Methodology

The study population was divided into two groups: Group A (Vaginal Delivery) consisting of women who delivered spontaneously or with minimal instrumental assistance, and Group B (Cesarean Section) comprising women who underwent lower segment cesarean section (LSCS) for obstetric indications. Each group included 42 patients. Both groups were comparable in terms of age, parity, and gestational age at delivery to minimize confounding factors.

Maternal recovery was assessed using multiple parameters reflecting both physiological and functional restoration after delivery. The primary parameters included the time to ambulation, measured in hours post-delivery; time to initiation of oral intake; duration of hospital stay in days; and time to return of bowel movements. Pain intensity was evaluated using the Visual Analogue Scale (VAS) at 12, 24, and 48 hours postpartum to assess the degree and progression of pain relief. The amount of postpartum blood loss was determined through pad count and by comparing pre- and post-delivery hemoglobin levels to evaluate the degree of blood loss objectively. Incidences of postpartum complications such as fever, wound infection, urinary retention, or thromboembolic events were recorded and analyzed. Additionally, maternal satisfaction and emotional well-being were assessed using a standardized questionnaire before discharge to capture the subjective aspect of recovery and overall maternal experience.

Statistical Analysis

Data were collected using a structured proforma designed specifically for the study. All relevant clinical and demographic data were recorded immediately after delivery and during the postpartum hospital stay. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 16.0. Independent t-test and Chi-square test were applied for comparison between the two groups as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographic Characteristics

Table 1 shows the demographic characteristics of the 84 women included in the study, divided equally between the vaginal delivery and cesarean section groups. The mean age of patients in the vaginal delivery group was 26.84 ± 4.21 years, while that of the cesarean section group was 27.31 ± 4.09 years; the difference was statistically insignificant ($p = 0.54$). Similarly, the parity distribution between the two groups was comparable, with 59.52% primipara and 40.48% multipara in the vaginal delivery group, compared to 64.28% primipara and 35.72% multipara in the cesarean section group ($p > 0.05$). The mean gestational age at delivery was also similar between groups (38.62 ± 1.14 weeks for vaginal delivery and 38.47 ± 1.09 weeks for cesarean section; $p = 0.49$). These results indicate that both groups were demographically and obstetrically comparable, reducing the likelihood of confounding factors influencing the outcomes.

Maternal Recovery Parameters

Table 2 highlights a significant difference in recovery patterns between the two groups. The mean time to ambulation was markedly shorter among women who delivered vaginally (5.42 ± 1.27 hours) compared to those who underwent cesarean section (15.76 ± 3.54 hours), with a highly significant p-value < 0.001. Similarly, oral intake was resumed earlier in the vaginal delivery group (3.26 ± 0.92 hours) than in the cesarean section group (9.38 ± 2.15 hours), again statistically significant ($p < 0.001$). The duration of hospital stay was considerably less for vaginal delivery (2.64 ± 0.71 days) compared to cesarean section (6.14 ± 1.23 days, $p < 0.001$). Additionally, the return of bowel movements occurred earlier in vaginal deliveries (9.48 ± 2.36 hours) than in cesarean sections (17.52 ± 3.89 hours, $p < 0.001$). These findings strongly suggest that vaginal delivery facilitates faster physiological recovery and shorter hospital dependency compared to cesarean section.

Pain Intensity (VAS Score)

Pain intensity, measured using the Visual Analogue Scale (VAS), is summarized in Table 3. At 12 hours post-delivery, women who had vaginal births reported a mean VAS score of 4.18 ± 0.94, significantly lower than 7.92 ± 1.06 among cesarean patients ($p < 0.001$). The difference remained statistically significant at 24 hours (2.86 ± 0.81 vs. 6.45 ± 1.12, $p < 0.001$) and 48 hours (1.52 ± 0.65 vs. 3.24 ± 0.87, $p < 0.001$). This consistent trend across all time points demonstrates that postoperative pain is substantially higher and more prolonged following cesarean section. The rapid decline in pain scores among vaginal delivery patients further emphasizes faster recovery and comfort restoration in this group.

Postpartum Blood Loss and Hemoglobin Levels

As shown in Table 4, the mean estimated blood loss during vaginal delivery was 312.48 ± 76.25 mL, which was significantly lower than 581.36 ± 102.17 mL recorded for cesarean sections ($p < 0.001$). The pre-delivery hemoglobin levels were similar in both groups (11.82 ± 0.89 g/dL vs. 11.74 ± 0.95 g/dL, $p = 0.67$), indicating comparable pre-delivery status. However, post-delivery hemoglobin was significantly lower among cesarean section patients (9.84 ± 1.02 g/dL) compared to the vaginal delivery group (10.96 ± 0.91 g/dL, $p < 0.001$). These results suggest that surgical intervention is associated with greater intraoperative blood loss, contributing to postoperative anemia and delayed recovery.

Postpartum Complications and Maternal Satisfaction

Table 5 presents data on postpartum complications and maternal satisfaction. The incidence of fever was higher in cesarean section patients (16.67%) compared to vaginal delivery (4.76%), although this difference was not statistically significant ($p = 0.08$). Wound infection occurred exclusively among cesarean patients (14.28%, $p = 0.01$), highlighting a significant postoperative risk. Urinary retention and thromboembolic events were more frequent in the cesarean group (11.90% and 2.38%, respectively), though these differences were not statistically significant ($p > 0.05$). Maternal satisfaction, however, was significantly higher among women who delivered vaginally (85.71%) compared to cesarean deliveries (52.38%, $p = 0.001$). Similarly, emotional well-being scores were better in the vaginal delivery group (88.09%) than the cesarean group (57.14%, $p = 0.002$).

Table 1: Demographic Characteristics of Study Participants (n = 84)

Parameter	Vaginal Delivery (n = 42)	Cesarean Section (n = 42)	p-value
Mean Age (years)	26.84 ± 4.21	27.31 ± 4.09	0.54
Primipara (%)	25 (59.52%)	27 (64.28%)	0.65
Multipara (%)	17 (40.48%)	15 (35.72%)	0.68
Mean Gestational Age (weeks)	38.62 ± 1.14	38.47 ± 1.09	0.49

Table 2: Comparison of Maternal Recovery Parameters

Parameter	Vaginal Delivery (Mean ± SD)	Cesarean Section (Mean ± SD)	p-value
Time to Ambulation (hours)	5.42 ± 1.27	15.76 ± 3.54	<0.001*
Time to Oral Intake (hours)	3.26 ± 0.92	9.38 ± 2.15	<0.001*
Duration of Hospital Stay (days)	2.64 ± 0.71	6.14 ± 1.23	<0.001*
Time to Return of Bowel Movements (hours)	9.48 ± 2.36	17.52 ± 3.89	<0.001*

Table 3: Comparison of Pain Intensity (VAS Score)

Time Interval	Vaginal Delivery (Mean ± SD)	Cesarean Section (Mean ± SD)	p-value
12 hours	4.18 ± 0.94	7.92 ± 1.06	<0.001*
24 hours	2.86 ± 0.81	6.45 ± 1.12	<0.001*
48 hours	1.52 ± 0.65	3.24 ± 0.87	<0.001*

Table 4: Comparison of Postpartum Blood Loss and Hemoglobin Levels

Parameter	Vaginal Delivery (Mean ± SD)	Cesarean Section (Mean ± SD)	p-value
Estimated Blood Loss (mL)	312.48 ± 76.25	581.36 ± 102.17	<0.001*
Mean Pre-delivery Hemoglobin (g/dL)	11.82 ± 0.89	11.74 ± 0.95	0.67
Mean Post-delivery Hemoglobin (g/dL)	10.96 ± 0.91	9.84 ± 1.02	<0.001*

Table 5: Postpartum Complications and Maternal Satisfaction

Parameter	Vaginal Delivery (n = 42)	Cesarean Section (n = 42)	p-value
Fever (%)	2 (4.76%)	7 (16.67%)	0.08
Wound Infection (%)	0 (0.00%)	6 (14.28%)	0.01*
Urinary Retention (%)	1 (2.38%)	5 (11.90%)	0.09
Thromboembolic Events (%)	0 (0.00%)	1 (2.38%)	0.31
Maternal Satisfaction (High) (%)	36 (85.71%)	22 (52.38%)	0.001*
Emotional Well-being (Good) (%)	37 (88.09%)	24 (57.14%)	0.002*

DISCUSSION

Our two groups were demographically comparable—mean age 26.84 ± 4.21 vs 27.31 ± 4.09 years (p = 0.54), primiparity 59.52% vs 64.28%, and mean gestational age 38.62 ± 1.14 vs 38.47 ± 1.09 weeks (p = 0.49)—minimising confounding in recovery comparisons. Large population analyses have similarly contrasted outcomes after balancing baseline factors: in a Canadian cohort of low-risk term births, Liu et al. (2007) reported higher severe maternal morbidity with planned cesarean than planned vaginal delivery despite broadly similar baseline profiles (e.g., postpartum cardiac arrest excess 1.6/1000 with planned cesarean), supporting the importance of comparable groups when interpreting post-delivery recovery and complications.[8]

Our recovery endpoints strongly favoured vaginal birth: ambulation 5.42 ± 1.27 h vs 15.76 ± 3.54 h, oral intake 3.26 ± 0.92 h vs 9.38 ± 2.15 h, bowel movement 9.48 ± 2.36 h vs 17.52 ± 3.89 h (all p < 0.001), and hospital stay 2.64 ± 0.71 vs 6.14 ± 1.23 days (p < 0.001). Multinational WHO surveys echo that cesarean delivery is associated with more maternal morbidity and resource use than vaginal birth; Lumbiganon et al. (2010) reported higher odds of severe maternal outcomes with cesarean across Asian facilities, consistent with our longer hospitalisation and delayed functional recovery in the cesarean group.[9]

Pain trajectories also differed: VAS at 12/24/48 h was 4.18/2.86/1.52 after vaginal birth versus 7.92/6.45/3.24 after cesarean (all p < 0.001). While our data show greater acute pain burden after cesarean, persistent pain risk is driven most by the severity of acute pain itself. In a multicentre cohort (n = 1288), Eisenach et al. (2008) found that *severity of acute postpartum pain*, rather than mode of delivery per se, predicted chronic pain and postpartum depression—aligning with our finding of higher early pain after cesarean and underscoring the need for aggressive analgesia in that group.[10]

Greater blood loss with cesarean in our cohort (581.36 ± 102.17 mL vs 312.48 ± 76.25 mL, p < 0.001) translated into a larger hemoglobin fall (post-delivery Hb 9.84 ± 1.02 vs 10.96 ± 0.91 g/dL, p < 0.001). Measurement-method studies have shown that accurate quantification reveals substantial losses at both cesarean and vaginal delivery; using alkaline hematin, Larsson et al. (2006) validated blood-loss estimation across 29 elective cesareans and 26 vaginal births, highlighting the tendency to underestimate loss and reinforcing our observed clinically meaningful differential between modes.[11]

Earlier bowel recovery and shorter stay among cesarean patients can be facilitated by enhanced postoperative care. Randomised trials of *early feeding after cesarean* demonstrate faster gastrointestinal recovery: in a controlled trial of 182 women, offering

a low-residue diet at 6 h reduced ileus symptoms and hastened bowel function versus traditional delayed feeding; our cesarean cohort's median bowel-movement time (17.52 h) is consistent with the benefit window shown when early feeding is adopted.[12]

Similarly, another randomised study (n = 179) showed that immediate postoperative clear fluids and early solids after cesarean advanced return of bowel sounds and shortened length of stay compared with delayed feeding; our 6.14-day mean stay in the cesarean group suggests that adopting such protocols locally could narrow the gap toward the 2–4-day stays often reported with early-feeding pathways.[13]

Postoperative complications in our study concentrated in the cesarean group, notably wound infection 14.28% vs 0.00% (p = 0.01) and a higher, though nonsignificant, fever 16.67% vs 4.76% (p = 0.08). Elective cesarean in matched low-risk women has been linked to increased maternal morbidity including febrile morbidity and significant blood loss; Pallasmaa et al. (2010) (age- and parity-matched analysis) reported higher rates of wound infection and febrile morbidity after elective cesarean than planned vaginal birth, aligning with our complication gradient.[14]

The resource implications of post-cesarean infectious morbidity are substantial. In a 2010 cohort, Olsen et al. (2010) quantified that surgical-site infection and endometritis after low-transverse cesarean carried significant *attributable costs* and prolonged hospitalisation—paralleling our finding of a >3-day longer stay after cesarean and a 14.28% wound-infection rate concentrated in that group.[15]

Risk stratification further explains the infection pattern we observed. In a prospective cohort of Danish cesareans, Leth et al. (2011) showed obesity and diabetes substantially increased in-hospital and post-discharge infections after cesarean; while our groups were broadly comparable, the intrinsically higher surgical-site-infection susceptibility of cesarean patients helps explain our 14.28% wound-infection rate despite exclusion of major medical comorbidities.[16]

Finally, maternal-reported outcomes mirrored clinical differences: we found high satisfaction in 85.71% of vaginal births vs 52.38% after cesarean (p = 0.001) and good emotional well-being in 88.09% vs 57.14% (p = 0.002). Carquillat et al. (2013) reported that mode of delivery significantly influenced childbirth satisfaction, with spontaneous vaginal birth generally associated with higher scores—consistent with our satisfaction gap.[17]

CONCLUSION

The present comparative study demonstrated that vaginal delivery is associated with faster maternal recovery, including earlier ambulation, oral intake, bowel movement, reduced pain intensity, shorter hospital stay, and fewer postoperative complications compared to cesarean section. Cesarean delivery, while often lifesaving, was linked to greater blood loss, higher infection rates, and lower maternal satisfaction. Overall, vaginal delivery promotes quicker physiological and psychological recovery, emphasizing its preference when no obstetric contraindications exist.

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