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Original Research Article

Incidence, indication and complications of primary caesarean section in primigravida and multigravida at secondary care centre

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ABSTRACT

Background: Caesarean section (CS) is one of the most common obstetric surgeries, with rates rising globally beyond the World Health Organization's recommended 10–15%. Its overuse increases maternal risks like hemorrhage and abnormal placentation and neonatal issues such as respiratory distress. Understanding the incidence and causes of primary CS, especially in primigravida and multigravida, is essential. This study aimed to compare their incidence, indications and maternal-fetal complications at a secondary care hospital.
Methods: This prospective observational included a total of 1200 women were enrolled 600 primigravida (Group A) and 600 multigravidas with previous vaginal deliveries (Group B). Women with prior CS or non-viable pregnancies were excluded. Data on demographics, obstetric history and outcomes were recorded. Mode of delivery, CS indications and complications were analyzed. Statistical analysis was done using SPSS v26; $p<0.05$ was significant.
Results: Of 1200 women, 315 (26.25%) underwent CS, more in primigravida (30.33%) than multigravida (22.17%). Elective CS was higher in Group A (15.0% vs 8.5%), most often for oligohydramnios. Emergency CS was mainly for fetal distress in primigravida (32.61%) and meconium-stained liquor in multigravida (24.39%). PPH was more frequent in multigravida (9.02%). Neonatal outcomes showed no significant differences.
Conclusions: Primary CS was more common in primigravida, especially elective cases. Fetal distress and meconium-stained liquor were leading emergency indications. PPH was higher in multigravida, while neonatal outcomes were comparable. Improved antenatal care and counselling may reduce unnecessary CS, with parity-based interventions enhancing outcomes.

Keywords: Caesarean section, Fetal distress, Maternal complications, Multigravida, Neonatal outcomes, Primigravida

INTRODUCTION

CS is one of the most widely performed surgical procedures in obstetrics, with a progressive global increase. To understand the extent to which CS may be preventable, it is essential to know the indications. WHO recommends a CS incidence of 10–15% to ensure optimum outcomes.[1] More than 85% of CS are performed for four main reasons: previous CS (44%), dystocia (10%), foetal compromise (10%) and abnormal foetal presentation (3%). Caesarean on maternal request is a rising indication, accounting for 1–7%.[1] Other causes include severe pelvic contraction, placenta previa, pre-eclampsia and eclampsia. In multigravida, common indications are foetal distress, malpresentation and cephalopelvic disproportion.[2] Primary CS is defined as a cesarean performed for the first time in a patient.[3] Indications have changed over the decades, influenced by obstetric, medical, social, ethical, economic and medicolegal factors. Rising rates in teaching hospitals are linked to technological advances such as ultrasound diagnosis of oligohydramnios, cord around neck, Doppler studies, infertility treatments, abnormal CTG and on-demand cesarean.[4] The skill of an obstetrician is reflected not by how many CS are performed, but by those avoided.[5] CS exposes women and infants to immediate and long-term health risks.[6] Maternal

complications include death, infection, uterine rupture, bladder injury and abnormal placentation. For infants, altered hormonal and microbial physiology may increase risks of allergies, asthma and obesity.[7] Since 1985, WHO has advocated maintaining CS rates at 10–15%.[8,9] Despite this, CS has been overused globally. Almost a third of women now deliver by CS.[10] In 2015, 29.7 million births (21.1%) occurred by CS, nearly double the 2000 rate (12.1%), with 6.2 million excess procedures performed annually without medical justification.[10,11] Short-term maternal risks include haemorrhage, organ injury, infection and thrombosis. Long-term risks include placenta previa, placenta accreta and uterine rupture.[12] Intraoperative complications are higher when CS is done in the second stage of labour.[13] Proper understanding of risks, benefits and indications allows clinicians to counsel patients effectively, especially in cases of maternal request. This study aims to determine the incidence, indications and complications of primary CS in primigravida versus multigravida at a secondary care centre and to explore ways to reduce unnecessary primary CS.

METHODS

Study design and setting

This was an observational, prospective study conducted in the Department of Obstetrics and Gynaecology at General Hospital, Sector 6, Panchkula. The hospital is a secondary care government facility catering to urban and semi-urban populations, with referrals from surrounding primary health centres. The study was carried out over a period of 18 months.

Study population and sample size

All pregnant women admitted for delivery who met the eligibility criteria were considered. The participants were categorized into two groups. Group A included primigravida women with singleton term pregnancies, while Group B included multigravida women with at least one previous vaginal delivery. Each group consisted of 600 women, making the total sample size 1200.

Inclusion and exclusion criteria

Women were included if they were primigravida with singleton term pregnancies (≥37 weeks), multigravida with at least one previous viable delivery and willing to give informed consent. Exclusion criteria were non-viable pregnancies, previous caesarean section or myomectomy, gravida six and above and unwillingness to participate.

Study methods

Eligible participants were enrolled after obtaining written informed consent. A detailed history was taken, followed by general and abdominal examinations. Routine laboratory investigations, including complete blood count, liver and kidney function tests, coagulation profile, viral markers and blood group testing, were performed. Transabdominal sonography was carried out to assess fetal well-being. All participants were admitted for delivery and monitored. Based on the outcome, they were categorized according to the mode of delivery, whether vaginal, elective caesarean section or emergency caesarean section. The incidence of CS was calculated separately for each group and the indications for CS were analyzed in detail.

Statistical analysis

Data were entered in Microsoft Excel and analyzed using SPSS version 26 (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as mean with standard deviation where applicable. Categorical variables were presented as frequency and percentage and comparisons between groups were performed using the Chi-square test. Differences in means between two or more groups were assessed using the Student's t-test. A p-value of <0.05 or <0.001 was considered statistically significant.

RESULTS

The overall incidence of CS was 26.25% (n=315), while 73.75% (n=885) women delivered vaginally. In Group A (primigravida), 90 women underwent elective LSCS and 92 underwent emergency LSCS, giving a total incidence of 30.33%. In Group B (multigravida), 51 women had elective LSCS and 82 had emergency LSCS, with a total incidence of 22.17%. Elective LSCS was significantly more common in Group A, while emergency LSCS rates were similar (Table 1). In Group A, the most common indication for elective LSCS was oligohydramnios (29, 32.22%), followed by breech presentation (26, 28.89%) and transverse lie (2, 2.22%). In Group B, oligohydramnios was also the most frequent (17, 33.33%), with breech at 11 (21.57%) and transverse lie at 11 (21.57%).

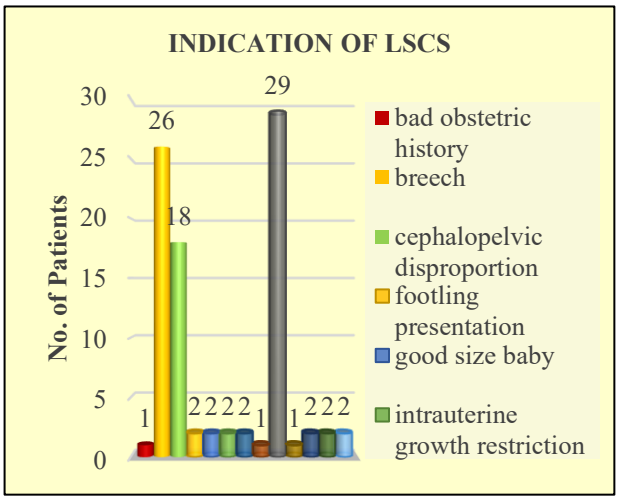

Figure 1: Indication of elective LSCS of the patients in Group A.

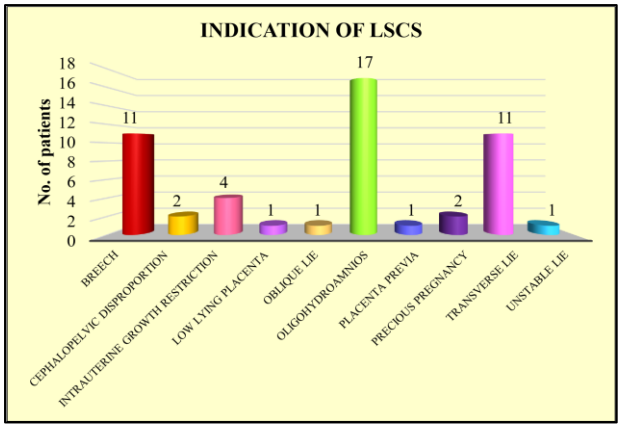

Figure 2: Indication of elective LSCS of the patients in Group B.

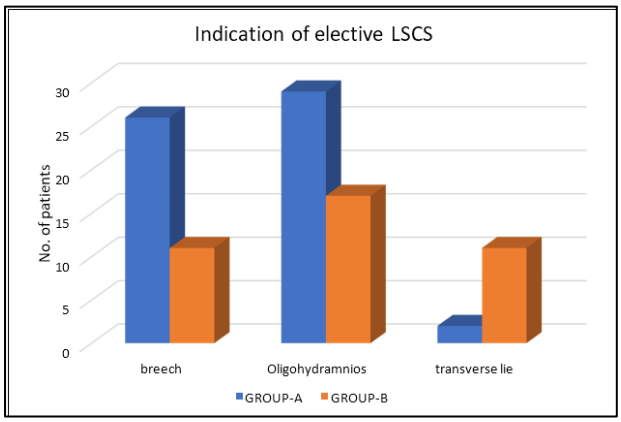

Figure 3: Comparison of indication of elective LSCS of the patients between groups.

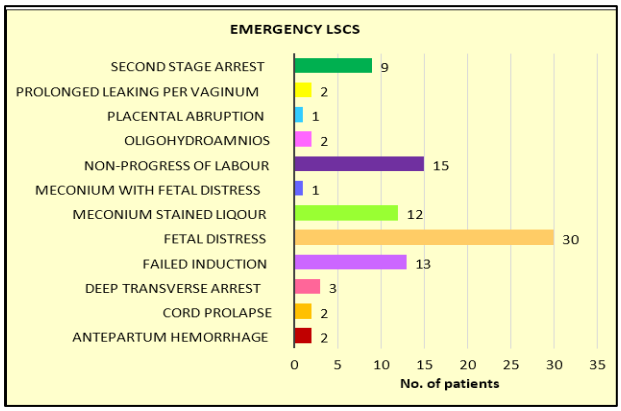

Figure 4: Indication of emergency LSCS of the patients in Group A.

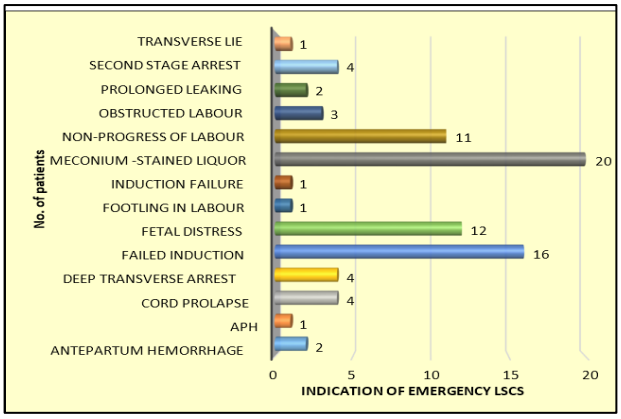

Figure 5: Indication of emergency LSCS of the patients with Group B.

Transverse lie showed a statistically significant difference between groups (p=0.0004), while breech and oligohydramnios were not significantly different (Figure 1-3). In emergency LSCS, fetal distress was most common in Group A (32.61%), followed by non-progress of labour (16.30%) and failed induction (14.13%). In Group B, meconium-stained liquor (24.39%) was the leading cause, followed by failed induction (19.51%) and fetal distress (14.63%). Fetal distress was significantly more frequent in primigravida (p=0.0096) (Table 2, Figure 4 and 5). The mean age was 24.25±2.67 years in Group A and 26.43±4.17 years in Group B (p<0.0001). Mean BMI was lower in primigravida (21.41±2.24) compared to multigravida (23.87±2.76, p<0.0001). Most women in both groups belonged to the lower socioeconomic class (Table 3).

Most CS were performed at 38–40 weeks (76.92% in Group A, 84.21% in Group B). Antenatal visits were significantly more frequent in Group B (p=0.0006) (Table 4). PPH was significantly higher in Group B (9.02% vs 2.20%, p=0.0061), while other complications such as bladder injury and uterine angle extension were comparable (Table 5).

Neonatal outcomes were statistically similar. Apgar <7 at 1 min was seen in 2.75% of Group A and 6.77% of Group B and at 5 min in 0.55% and 2.26% respectively. SNCU admissions were 15.93% in Group A and 11.28% in Group B, while neonatal deaths occurred in 1.65% and 0.75%. Most babies in both groups weighed 3000–3500 g, with no significant difference in birth weight distribution (p=0.9686) (Table 6).

Table 1: Comparison of the incidence of caesarean sections between Group A and Group B.

Incidence of caesarean section	Group-a (n=600)		Group-b (n=600)		P value
	N	%	N	%	
Elective LSCS	90	15.00%	51	8.50%	X=11.624 p=0.0006
Emergency LSCS	92	15.33%	82	13.67%	X=0.547 p=0.4606

Table 2: Comparison of indications for emergency LSCS among patients in Group A and Group B.

Emergency LSCS	Group-a (n=600)		Group-a (n=600)		P value
	N	%	N	%	
Failed induction	13	28.89%	16	19.51%	X=0.574 p=0.455
Foetal distress	30	32.22%	12	14.63%	X=6.751 p=0.0096
Meconium-stained Liquor	12	2.22%	20	24.39%	X=3.524 p=0.0869
Non progress of labour	15	16.30%	11	13.41%	X=0.1024 p=0.748

Table 3: Demographic characteristics of patients undergoing caesarean section in both groups.

Demographics		Group-a (n=182)		Group-b (n=133)		P value
		N	%	N	%	
Age (in years)	17-21	26	14.29%	21	15.79%	X=57.38 <0.0001
	22-26	133	73.08%	49	36.84%	
	27-31	20	10.99%	46	34.59%	
	32-36	2	1.10%	17	12.78%	
	37-41	2	1.10%	0	0.00%	
Socioeconomic Status	Upper class	**7**	3.85%	4	3.01%	X=1.343 p=0.719
	Middle class	15	8.24%	9	6.77%	
	Lower-middle class	65	35.71%	42	31.58%	
	Lower class	95	52.20%	78	58.65%	

Table 4: Comparison of gestational period and antenatal visit frequency among caesarean section patients.

Antenatal profile		Group-a (n=182)		Group-b (n=133)		P value
		N	%	N	%	
Period of gestation	≤37	40	21.98	18	13.53	X=4.134 p=0.1266
	38-40	140	76.92	112	84.21	
	41-42	2	1.10	3	2.26	
	Mean±SD	38.34±0.94		38.53±1.02		t=1.709 p=0.0884
No. of ANC visit	2-4	19	10.44	2	1.50	X=17.24 0.0006
	5-7	117	64.29	111	83.46	
	8-10	31	17.03	12	9.02	
	11-13	15	8.24	8	6.02	

Table 5: Intraoperative and postoperative complications in patients undergoing caesarean section between the two groups.

Complications			Group-A (n=182)		Group-B (n=133)		P value
			N	%	N	%	
Intro-op complication	Yes	Bladder injury	3	1.65	1	0.75	p=0.4784
		PPH	4	2.20	12	9.02	p=0.0061
		Thinned out lower segment	6	3.30	5	3.76	p=1.000
		Uterine angle extension	9	4.95	5	3.76	p=1.333
		Bladder pulled up	0	0.00	2	1.50	---
		Impending uterine rupture	0	0.00	1	0.75	---
	No complication		160	87.91	110	82.71	----
Post-op complication	Yes	Blood transfusion	2	1.65	8	4.51	X=5.7013 p=0.0169*
		Post spinal Headache	7	3.85	9	6.77	
		PPH	2	2.20	9	3.01	
		Puerperal pyrexia	6	3.30	5	3.76	
		Urinary tract infection	1	2.20	8	0.75	
		URTI	4	2.20	3	2.26	

Continued.

Complications		Group-A (n=182)		Group-B (n=133)		P value
		N	%	N	%	
	Wound infection	12	6.59	3	2.26	
	Urinary retention	0	0.00	1	0.75	
No complication		155	85.16	98	73.68	

Table 6: Neonatal outcomes among caesarean section patients.

Neonatal outcomes	Group-a (n=182)		Group-b (n=133)		P value
	N	%	N	%	
Apgar score at 1 min					
<7	5	2.75	9	6.77	X=0.601 p=0.4377
≥7	177	97.25	124	93.23	
Apgar score at 5 min					
<7	1	0.55	3	2.26	X=0.926 p=0.3358
≥7	181	99.45	130	97.74	
SNCU admission					
Yes	29	15.93	15	11.28	X=1.386 p=0.2391
No	153	84.07	118	88.72	
Neonatal death					
Yes	3	1.65	1	0.75	X=0.4926 p=0.4828
No	179	98.35	132	99.25	
Birth weight					
<2500	24	13.19	19	14.29	X=1.354 p=0.9686
2500-3000	41	22.53	32	24.06	
3000-3500	71	39.01	51	38.35	
3500-4000	22	12.09	15	11.28	
4000-4500	15	8.24	9	6.77	
4500-500	7	3.85	4	3.01	
>5000	2	1.10	3	2.26	

DISCUSSION

Caesarean deliveries have increased globally and primigravida and multigravida women often differ in indications, complications and delivery decisions. This study compared primary caesarean section (PCS) rates, indications and complications in these groups at a secondary care facility. In the study, the overall CS rate was 26.25% (n=315), while 885 women (73.75%) delivered vaginally. In Group A (primigravida, n=600), 90 women (15.00%) had elective LSCS and 92 (15.33%) had emergency LSCS, totalling 30.33% (n=182). In Group B (multigravida, n=600), 51 women (8.50%) had elective LSCS and 82 (13.67%) had emergency LSCS, totalling 22.17% (n=133). Bamon et al reported 64.8% primigravida and 35.2% multigravida among PCS patients (p=0.001), similar to our findings.[12]

Elective LSCS was higher in Group A (15.00% vs 8.50%, p=0.0006), while emergency LSCS rates were comparable (15.33% vs 13.67%, p=0.4606). Emergency PCS predominated in both groups, as reported by Bamon et al (96.8% vs. 94.1%).[12] However, the proportion of elective PCS was higher in our study (Group A: 15% vs. 3.2%, Group B: 8.5% vs. 5.9%). Compared to other studies, multigravida PCS in our study (22.7%) was lower than Gupta and Garg (27.24%) but higher than Alagesan and Meena (7.08%).[14,15] PCS in primigravida was lower (30.33%) than Jain and Patel and Gupta and Garg (72.40%), likely due to high-risk referrals, highlighting the impact of regional and referral patterns on PCS rates.[14,16]

In Group A (primigravida), elective LSCS was most commonly due to oligohydramnios (32.22%), breech presentation (27.78%) and CPD (20.00%), while rare causes included macrosomia, placenta previa and poor obstetric history (1.11%). Emergency LSCS was primarily for fetal distress (32.61%), non-progress of labour (16.30%) and failed induction (14.13%). These findings align with Bamon et al and others while Birla et al, reported meconium-stained liquor as more common.[12,17-19] In Group B (multigravida), elective LSCS was mostly for oligohydramnios (33.33%), breech presentation (21.57%) and transverse lie (21.57%). Emergency LSCS was mainly for meconium-stained liquor (24.39%), failed induction (19.51%) and fetal distress (14.63%).

This differed from Bamon et al, who reported CPD (47.92%) as the leading cause and Birla et al who cited APH and abruptio placenta.[12,19] Most patients were from lower socioeconomic classes 52.20% in Group A and 58.65% in Group B (p=0.719). These results highlight the need for thorough prenatal care and intrapartum monitoring in primigravidas and early detection, prompt referral and family planning in multigravidas to reduce emergency LSCS and maternal-fetal complications. In Group-A (primigravida), most caesarean sections occurred in the 22–26 years age group (73.63%). In Group-B, the 22–26 years group also predominated (36.84%). The mean age was 24.25±2.67 years in Group-A and 26.43±4.17 years in Group-B, with a highly significant difference (p<0.0001). These results were comparable to Bamon et al and Alagesan and Meena, though other studies showed variations due to regional multiparity and early marriage patterns.[12-14-16] Most caesareans in Group-A occurred at 38–40 weeks (76.92%), ≤37 weeks (21.98%) and 41–42 weeks (1.10%), while in Group-B, 38–40 weeks predominated (84.21%), followed by ≤37 weeks (13.53%) and 41–42 weeks (2.26%). Mean gestational ages were 38.34±0.94 weeks and 38.53±1.02 weeks, with no significant difference, partly aligning with Bamon et al and Rajput et al.[2,12] Primigravida patients had a significantly lower mean BMI (21.41±2.24) than multigravida (23.87±2.76) (p<0.0001), with most having normal BMI due to regional dietary habits (Group-A 52.20%, Group-B 58.65%). In Group-A, most women had 5–7 ANC visits (64.29%), while in Group-B, 83.46% had 5–7 visits, with a significant difference (p=0.0006). Bamon et al, reported that most primary caesarean patients in Group-A (44.7%) and Group-B (49.0%) were unbooked, which was not significant (p=0.198).[12] Our study showed more unbooked patients in Group-B, higher than Gupta and Garg but similar to Sharmila and Nishitha and others reflecting regional practices where home births remain common.[14,20,21]

No significant differences were found for religion, contraception use, booking status, marital status or pre-existing conditions. Intraoperative complications occurred in 12.09% of Group-A and 19.6% of Group-B, with most patients having no complications (Group-A 87.91%; Group-B 80.4%). In Group-A, uterine angle extension (4.95%) was most common, followed by thinned lower segment (3.30%), PPH (2.20%) and bladder injury (1.65%). In Group-B, PPH was highest (9.02%), followed by thinned lower segment and uterine angle extension (3.67% each), bladder pulled up (1.50%), bladder injury (0.75%) and uterine rupture (0.75%). PPH was significantly higher in Group-B (p=0.0061), while uterine wound extension in Group-A (4.95%) was not significantly different (p=1.333). Bamon et al similarly reported higher PPH in Group-B (77.3%, p=0.029) and uterine wound extension in Group-A (80%, p=0.017).[12] Birla et al reported lower PPH incidence.[19] Postoperative complications were 18.69% in Group-A and 34.59% in Group-B. In Group-A, wound infection (6.59%) was most common, followed by post-spinal headache (3.85%) and puerperal pyrexia (3.30%).

In Group-B, PPH (6.77%) and post-spinal headache were most frequent; blood transfusion (6.01%), URTI (2.26%) and puerperal pyrexia (3.76%) were also reported. Kolawole et al, reported 14% wound infection in primigravida, comparable to the 6.59%.[22] Bamon et al similarly found more postoperative complications in Group-B (25.49%) than Group-A (13.82%).[12] Respiratory infections were the most frequent postoperative complication in both groups. Overall, intraoperative risks were similar, but PPH and postoperative complications were higher in multigravidas, emphasizing the need for improved prenatal care and risk management. In the present study, Apgar scores at one minute <7 were observed in 2.75% of Group A and 6.77% of Group B, while 97.25% and 93.23% had scores ≥7, with no significant difference (p=0.4377). At five minutes, 0.55% of Group A and 2.26% of Group B had scores <7 (p=0.3358). SNCU admissions were 15.93% in Group A and 11.28% in Group B (p=0.2391).

Neonatal mortality was 1.65% in Group A and 0.75% in Group B (p=0.4828), with causes being respiratory distress and birth asphyxia in Group A and meconium aspiration in Group B. Overall, neonatal outcomes were comparable between the groups. Bamon et al reported similar findings: 96.8% of newborns in both groups had one-minute Apgar scores >7 (p=0.931) and five-minute scores were 97.9% in Group A and 94.1% in Group B (p=0.902).[12] Their study also showed no significant differences in early neonatal outcomes or neonatal mortality, consistent with the present results. In both groups, most babies weighed 3000–3500 g 39.01% in Group A and 38.35% in Group B. Babies 2500–3000 g comprised 22.53% in Group A and 24.06% in Group B. Low birth weight (<2500 g) was 13.19% in Group A and 14.29% in Group B, while 3500–4000g was 12.09% in Group A and 11.28% in Group B. Birth weights >4000 g were rare. No significant difference was found between groups (p=0.9686), indicating maternal parity did not affect neonatal birth weight. Bamon et al similarly reported most babies weighed 3000–3500 g, with no significant difference between groups (p=0.976).[12] Suresh et al found most PCS babies weighed 2500–3000g in primigravidas (46%) and multigravidas (28%), with 3000–3500 g as the next common range.[23] These findings align with the study, showing comparable neonatal birth weight trends in both groups.

CONCLUSION

In conclusion, the study highlights the key factors influencing the incidence of caesarean sections in primigravida and multigravida women. Notably, the overall caesarean section rate was higher among primigravidas, with common indications including oligohydramnios, breech presentation and fetal distress. In contrast, multigravidas had a lower rate, with emergency procedures often performed for meconium-stained liquor

and failed induction. Moreover, demographic factors such as age, BMI and antenatal care visits significantly influenced delivery outcomes. Although some differences in post-operative complications were observed, including higher rates of blood transfusion and postpartum hemorrhage in multigravidas, neonatal outcomes were largely similar across both groups. Therefore, these findings underscore the importance of personalized maternity care, considering maternal age, parity and medical history to optimize maternal and neonatal health. However, the study's single-center design, limited sample and restricted consideration of socio-economic and lifestyle factors may limit its generalizability. Consequently, future research should involve larger, multi-center samples and more comprehensive analyses, while training programs for healthcare providers could help reduce unnecessary caesarean sections.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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