

Influence of uterine fibroids on the intrapartum maternal outcome: A retrospective study.

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Abstract

Introduction

Uterine fibroids are common benign uterine tumours in women of reproductive age and can complicate labour through mechanical obstruction, altered uterine contractility, malpresentation, and postpartum haemorrhage. Their intrapartum influence varies according to fibroid size and anatomical location.

Materials and Methods

This hospital-based retrospective observational study included 120 pregnant women with documented uterine fibroids who delivered at a tertiary care teaching hospital in Bengaluru, India. Demographic, obstetric, ultrasonographic, intrapartum, and postpartum information was retrieved from hospital records. Fibroid number, size, location, lower uterine segment involvement, mode of delivery, caesarean indications, labour complications, postpartum haemorrhage, uterine atony, and transfusion requirement were assessed. Categorical associations were evaluated using appropriate tests, with $p < 0.05$ considered statistically significant.

Results

Of the 120 women, 35.0% were aged 30–34 years, 30.8% were aged 25–29 years, and 19.2% were aged ≥ 35 years; 60.0% were multigravidas. Most delivered at 37–40 weeks (75.8%), and 88.3% had cephalic presentation. Caesarean delivery occurred in 58.3%, whereas 41.7% had vaginal delivery. Intramural fibroids were most frequent (51.7%), and 48.3% had fibroids < 5 cm. Caesarean delivery increased with fibroid size: 50.0% for < 5 cm, 61.2% for 5–10 cm, and 84.6% for > 10 cm ($p = 0.027$). Lower uterine segment involvement was associated with a higher caesarean rate (81.8% vs 53.1%; $p = 0.014$). Labour dystocia occurred in 17.5%, postpartum haemorrhage in 13.3%, uterine atony in 10.8%, and blood transfusion in 7.5%.

Conclusion

Larger fibroids and lower uterine segment involvement were associated with increased caesarean delivery and clinically important maternal complications.

Recommendations

Antenatal assessment of fibroid size and location, individualized delivery planning, and preparedness for haemorrhagic complications are recommended.

Keywords: uterine fibroids; leiomyoma; pregnancy; caesarean section; postpartum haemorrhage.

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Introduction

Uterine fibroids, also known as leiomyomas, are benign smooth muscle tumours of the uterus and represent one of the most common benign pelvic tumours in women of reproductive age [1]. Their occurrence during pregnancy is clinically important because hormonal and vascular changes may influence fibroid growth and behaviour. Although many women with fibroids have uncomplicated pregnancies, the presence of fibroids has been associated with an increased risk of several obstetric complications, depending on their size, number, and anatomical location [2,3].

The effect of uterine fibroids on pregnancy and labour is influenced by their relationship to the uterine cavity, placenta, and lower uterine segment [4]. Large fibroids, particularly those located in the lower uterine segment or close to the cervix, may interfere mechanically with fetal descent and contribute to malpresentation or labour dystocia [5]. Fibroids may also be associated with placental abnormalities, preterm birth, caesarean delivery, and postpartum haemorrhage. However, the magnitude of these risks varies considerably among studies, and many women with fibroids still achieve favourable maternal outcomes [6].

Intrapartum management of women with uterine fibroids can therefore present specific clinical challenges [7].

Decisions regarding the mode and timing of delivery may be influenced by fibroid characteristics, previous obstetric history, fetal presentation, labour progression, and the presence of complications [8]. Increased rates of caesarean delivery and postpartum haemorrhage have been reported among women with fibroids, although the contribution of individual fibroid characteristics to these outcomes remains incompletely defined [9]. Evaluating maternal outcomes in women with fibroids is particularly relevant in tertiary care settings, where high-risk pregnancies and complicated deliveries are frequently managed [10].

Despite the increasing recognition of uterine fibroids in pregnancy, data regarding their influence on intrapartum maternal outcomes remain variable, particularly in individual institutional settings. Understanding the association between fibroid characteristics and delivery outcomes may assist clinicians in antenatal risk stratification, counselling, intrapartum planning, and appropriate selection of the mode of delivery. The present study aimed to evaluate the influence of uterine fibroids on intrapartum maternal outcomes among pregnant women managed at a tertiary care centre, with particular emphasis on mode of delivery and maternal complications.

Materials and methods

Study design and setting

This hospital-based retrospective observational study was conducted in the Department of Obstetrics and Gynaecology, ESIC Medical College, PGIMS and Model Hospital, Rajajinagar, Bengaluru, Karnataka, India. The institution is a tertiary-care teaching and referral hospital located in Rajajinagar in western Bengaluru and provides multidisciplinary services, including medicine, surgery, paediatrics, obstetrics and gynaecology, orthopaedics, anaesthesia, diagnostic services, critical care, 24-hour emergency care, and round-the-clock blood-bank support. The hospital has approximately 500 inpatient beds and primarily serves Employees' State Insurance beneficiaries and their dependants from Bengaluru, while also receiving referrals from surrounding areas of Karnataka. Pregnant women with documented uterine fibroids who delivered at the centre during the study period were identified from hospital records. The study covered deliveries from 01/06/2025 to 31/12/2025.

Study duration

The retrospective study period extended from 01/06/2025 to 31/12/2025. These dates correspond to the study period from June 2025 to December 2025. These exact dates should be completed from the approved study protocol or record-review log before resubmission.

Study population

The study population comprised pregnant women with documented uterine fibroids who delivered at the study centre during the study period. A total of 120 eligible women were included in the study. Data pertaining to maternal characteristics, obstetric history, fibroid characteristics, mode of delivery, indications for caesarean section, intrapartum complications, and postpartum maternal outcomes were recorded.

Inclusion criteria

Pregnant women with a documented diagnosis of uterine fibroid on antenatal ultrasonography or clinical records, who delivered at the study centre during the study period, were included. Women with complete relevant obstetric and maternal outcome records were considered eligible for analysis.

Exclusion criteria

Women with incomplete or unavailable medical records, those who did not deliver at the study centre, and women with major pre-existing medical conditions that could independently influence the maternal intrapartum outcome were excluded from the analysis.

Sampling technique

All eligible cases fulfilling the predefined inclusion and exclusion criteria during the study period were identified from the hospital records. A total of 120 women meeting the eligibility criteria were included in the final analysis.

Data collection

Data were collected retrospectively from patient case records, antenatal records, ultrasonography reports, labour room records, operative notes, and postpartum records. Information regarding maternal age, parity, gestational age at delivery, fetal presentation, antenatal complications, number and size of fibroids, fibroid location, lower uterine segment involvement, mode of delivery, indication for caesarean delivery, intrapartum complications, postpartum haemorrhage, blood transfusion, duration of hospital stay, intensive care admission, and other maternal outcomes was recorded using a predesigned data collection proforma.

Assessment of uterine fibroid characteristics

Fibroid characteristics were assessed based on antenatal ultrasonography and documented clinical records. The number of fibroids was classified as single or multiple. The largest fibroid was categorised according to size as

<5 cm, 5–10 cm, or >10 cm. Based on anatomical location, fibroids were classified as intramural, subserosal, submucosal, cervical/lower uterine segment, or involving multiple locations. The presence or absence of lower uterine segment involvement and proximity to the placenta was also recorded.

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Quantitative variables

Quantitative variables were retained in their recorded numerical form during data extraction and were summarized using the mean and standard deviation when approximately normally distributed or the median and interquartile range when skewed. For descriptive and clinically interpretable presentation, maternal age was grouped as <25, 25–29, 30–34, and ≥35 years; gestational age at delivery was grouped as <37, 37–40, and >40 weeks; and the largest fibroid diameter was grouped as <5 cm, 5–10 cm, and >10 cm. The gestational-age categories separated deliveries before 37 weeks from the principal 37–40-week delivery interval and those occurring beyond 40 weeks. Fibroid-size categories were used to distinguish small, intermediate, and very large lesions and to examine whether the frequency of caesarean delivery increased across clinically meaningful size strata. Categorisation was used for tabular presentation and association testing and did not alter the originally recorded measurements.

Assessment of intrapartum maternal outcome

Intrapartum maternal outcomes were assessed based on labour and delivery records. The mode of delivery was categorised as spontaneous vaginal delivery, assisted vaginal delivery, or caesarean section. For women undergoing caesarean delivery, the documented indication was recorded. Maternal intrapartum complications, including labour dystocia, malpresentation, postpartum haemorrhage, uterine atony, placental complications, requirement for blood transfusion, and emergency caesarean delivery, were documented.

Assessment of postpartum maternal outcome

Postpartum outcomes were assessed from the maternal records until discharge from the hospital. The occurrence of postpartum haemorrhage, blood transfusion, postpartum fever or infection, prolonged hospital stay, requirement for secondary intervention, intensive care admission, and maternal mortality was recorded.

Data management

The collected data were entered into a Microsoft Excel spreadsheet and subsequently checked for completeness and consistency. Each participant was assigned a unique study identification number, and personally identifiable information was excluded from the analytical dataset.

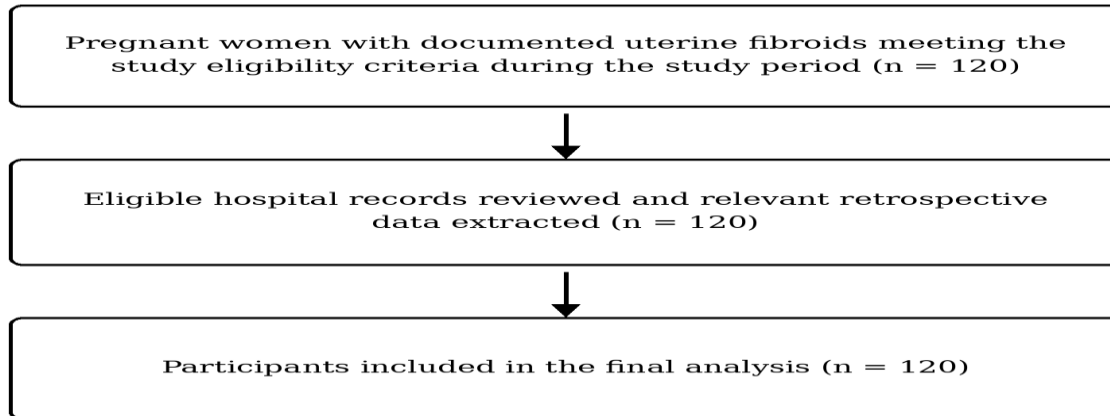
Statistical analysis

Data were analysed using IBM SPSS Statistics software. Categorical variables were summarized as frequencies and percentages. Continuous variables were summarized as mean ± standard deviation when approximately normally distributed and as median with interquartile range when distributional assumptions were not met. Associations between categorical fibroid characteristics and mode of delivery were assessed using the chi-square test; Fisher's exact test was reserved for contingency tables with small expected cell counts. A two-sided p-value <0.05 was considered statistically significant.

Ethical considerations: Ethical approval was obtained from the Ethics Committee, ESIC Medical College & PGIMSR & Model Hospital, Rajajinagar, Bengaluru, before commencement of the study. As this retrospective investigation used existing medical records, confidentiality and privacy were maintained throughout. Data were anonymised before analysis and used exclusively for research purposes.

Results

Figure 1. Participant flow through the study



Among the 120 women included in the study, the largest proportion belonged to the 30–34-year age group (35.0%), followed by 25–29 years (30.8%). Multigravidas constituted 60.0% of the study population, while 40.0% were primigravidas. Most women delivered between 37

and 40 weeks of gestation (75.8%), and cephalic presentation was observed in 88.3% of cases. Anemia (15.0%) was the most frequent antenatal complication, followed by gestational hypertension (7.5%) and gestational diabetes mellitus (6.7%). (Table 1)

Table 1: Maternal Demographic and Obstetric Characteristics of the Study Participants (N=120)

Variable	Category	n (%)
Age (years)	<25	18 (15.0%)
	25–29	37 (30.8%)
	30–34	42 (35.0%)
	≥35	23 (19.2%)
Parity	Primigravida	48 (40.0%)
	Multigravida	72 (60.0%)
Gestational age at delivery	<37 weeks	18 (15.0%)
	37–40 weeks	91 (75.8%)
	>40 weeks	11 (9.2%)
Presentation	Cephalic	106 (88.3%)
	Breech	10 (8.3%)
	Transverse/oblique	4 (3.3%)
Antenatal complications	None	79 (65.8%)
	Anemia	18 (15.0%)
	Gestational hypertension	9 (7.5%)
	Gestational diabetes mellitus	8 (6.7%)
	Other complications	6 (5.0%)

Note. Data are presented as n (%). Categories are based on the variables recorded in the study dataset.

Single fibroids were observed in 65.8% of women, while 34.2% had multiple fibroids. The largest fibroid measured

<5 cm in 48.3% of cases, 5–10 cm in 40.8%, and >10 cm in 10.8%. Intramural fibroids were the most common type (51.7%), followed by subserosal (25.8%) and submucosal fibroids (9.2%). Lower uterine segment involvement was

present in 18.3% of women, while 24.2% had fibroids located adjacent to the placenta. (Table 2)

Table 2: Characteristics of Uterine Fibroids Among the Study Participants (N=120)

Fibroid characteristic	Category	n (%)
Number of fibroids	Single	79 (65.8%)
	Multiple	41 (34.2%)
Largest fibroid size	<5 cm	58 (48.3%)
	5–10 cm	49 (40.8%)
	>10 cm	13 (10.8%)
Fibroid location	Intramural	62 (51.7%)
	Subserosal	31 (25.8%)
	Submucosal	11 (9.2%)
	Cervical/lower uterine segment	10 (8.3%)
	Mixed/multiple locations	6 (5.0%)
Location in relation to placenta	Away from placenta	91 (75.8%)
	Adjacent to placenta	29 (24.2%)
Lower uterine segment involvement	Present	22 (18.3%)
	Absent	98 (81.7%)

Note. Data are presented as n (%). Fibroid size refers to the largest documented fibroid diameter.

Spontaneous vaginal delivery occurred in 35.0% of women, while 6.7% underwent assisted vaginal delivery.

Caesarean section was the most common mode of delivery, accounting for 58.3% of all deliveries. Overall, 41.7% of women had a vaginal delivery, whereas 58.3% underwent caesarean delivery. (Table 3)

Table 3: Mode of Delivery Among Women with Uterine Fibroids (N=120)

Mode of delivery	n (%)
Spontaneous vaginal delivery	42 (35.0%)
Assisted vaginal delivery	8 (6.7%)
Caesarean section	70 (58.3%)
Total	120 (100.0%)

Note. Data are presented as n (%). Vaginal delivery includes spontaneous and assisted vaginal delivery when summarized in subsequent analyses.

Among the 70 women who underwent caesarean section, the most frequent indication was previous caesarean

section (22.9%), followed by malpresentation (18.6%) and labour dystocia or failed progress (17.1%). Fibroid-related obstruction of the birth canal accounted for 14.3% of caesarean deliveries, while fetal distress was observed in 12.9%. Placental complications and other indications each accounted for 7.1% of cases. (Table 4)

Table 4: Indications for Caesarean Delivery Among Women with Uterine Fibroids (n=70)

Indication for caesarean delivery	n (%)
Previous caesarean section	16 (22.9%)
Malpresentation	13 (18.6%)

Indication for caesarean delivery	n (%)
Labour dystocia/failed progress	12 (17.1%)
Fibroid obstructing birth canal	10 (14.3%)
Fetal distress	9 (12.9%)
Placental complications	5 (7.1%)
Other indications	5 (7.1%)
Total	70 (100.0%)

Note. Percentages are calculated among women who underwent caesarean delivery (n = 70).

Intrapartum complications were observed in a proportion of women, with labour dystocia or poor progress being reported in 17.5% and malpresentation in 11.7%.

Postpartum haemorrhage occurred in 13.3% of women, while uterine atony was observed in 10.8%. Blood transfusion was required in 7.5% of cases. Emergency caesarean delivery was performed in 31.7% of women. Since complications could overlap, the reported percentages were not mutually exclusive. (Table 5)

Table 5: Intrapartum Maternal Complications Among Women with Uterine Fibroids (N=120)

Intrapartum complication	n (%)
No intrapartum complication	72 (60.0%)
Labour dystocia/poor progress	21 (17.5%)
Malpresentation	14 (11.7%)
Postpartum haemorrhage	16 (13.3%)
Placental abruption	5 (4.2%)
Placenta previa	4 (3.3%)
Uterine atony	13 (10.8%)
Blood transfusion required	9 (7.5%)
Emergency caesarean delivery	38 (31.7%)

Note. Data are presented as n (%). Individual complications were not mutually exclusive.

A progressive increase in caesarean delivery was observed with increasing fibroid size. Caesarean delivery occurred in 50.0% of women with fibroids <5 cm,

compared with 61.2% of those with fibroids measuring 5–10 cm and 84.6% of those with fibroids >10 cm. The association between fibroid size and mode of delivery was statistically significant ($\chi^2=7.21$, $p=0.027$). (Table 6)

Table 6: Association Between Fibroid Size and Mode of Delivery

Largest fibroid size	Vaginal delivery, n (%)	Caesarean delivery, n (%)	Total
<5 cm	29 (50.0%)	29 (50.0%)	58
5–10 cm	19 (38.8%)	30 (61.2%)	49
>10 cm	2 (15.4%)	11 (84.6%)	13
Total	50 (41.7%)	70 (58.3%)	120

Note. Percentages are calculated within each fibroid-size category. The manuscript reports $\chi^2 = 7.21$, $p = .027$ for the association between fibroid size and mode of delivery.

Among women with lower uterine segment involvement, 81.8% underwent caesarean delivery compared with 53.1% of women without lower uterine segment

involvement. Vaginal delivery was observed in 18.2% and 46.9% of these groups, respectively. The association between lower uterine segment involvement and mode of delivery was statistically significant ($\chi^2=6.06$, $p=0.014$). (Table 7)

Table 7: Association Between Lower Uterine Segment Fibroid and Mode of Delivery

Lower uterine segment involvement	Vaginal delivery, n (%)	Caesarean delivery, n (%)	Total
Present	4 (18.2%)	18 (81.8%)	22
Absent	46 (46.9%)	52 (53.1%)	98
Total	50 (41.7%)	70 (58.3%)	120

Note. Percentages are calculated within lower-uterine-segment categories. The manuscript reports $\chi^2 = 6.06$, $p = .014$ for the association with mode of delivery.

Most women (78.3%) had no postpartum complication. Postpartum haemorrhage was the most frequent

postpartum complication, occurring in 13.3% of women, followed by prolonged hospital stay (11.7%) and blood transfusion (7.5%). Postpartum fever or infection was observed in 5.8% of cases, while secondary intervention for haemorrhage was required in 2.5%. Intensive care admission occurred in 1.7% of women, and no maternal deaths were recorded. (Table 8)

Table 8: Postpartum Maternal Outcomes (N=120)

Postpartum outcome	n (%)
No postpartum complication	94 (78.3%)
Postpartum haemorrhage	16 (13.3%)
Blood transfusion	9 (7.5%)
Postpartum fever/infection	7 (5.8%)
Prolonged hospital stay	14 (11.7%)
Secondary intervention for haemorrhage	3 (2.5%)
Intensive care admission	2 (1.7%)
Maternal mortality	0 (0.0%)

Note. Data are presented as n (%). Postpartum outcomes were assessed until hospital discharge; individual complications could overlap.

Discussion

In the present study, caesarean delivery was the most common mode of delivery, occurring in 58.3% of women with uterine fibroids, while 41.7% had vaginal delivery. This finding is consistent with previous evidence demonstrating an increased likelihood of caesarean delivery in pregnancies complicated by fibroids. A systematic review and meta-analysis involving 313,913 women reported that uterine fibroids were associated with significantly increased odds of caesarean delivery (OR

2.09, 95% CI 1.69–2.58) [11]. Similarly, a study by Martin et al. found higher rates of primary caesarean delivery among women with ultrasound-identified fibroids compared with women without fibroids, even after adjustment for potential confounders [12]. The increased caesarean rate in the present study may be related to mechanical interference with labour, malpresentation, previous caesarean delivery, and failure of labour progression.

A significant association was observed between fibroid size and mode of delivery in the present study, with caesarean delivery increasing from 50.0% among women with fibroids <5 cm to 61.2% among those with fibroids measuring 5–10 cm and 84.6% among those with fibroids >10 cm ($p=0.027$). This finding is comparable with the

observations of Al Sulaimani et al., who reported a significantly higher caesarean section rate among women with fibroids larger than 5 cm, with obstructed labour and failure to progress being important indications [13]. Similarly, Lam et al. demonstrated that increasing fibroid size was associated with greater obstetric morbidity, particularly haemorrhage and increased blood loss [14]. Larger fibroids may distort the uterine cavity, interfere with coordinated myometrial contractions, impede fetal descent, or mechanically obstruct the birth canal, thereby increasing the likelihood of operative delivery.

The location of the fibroid also appeared to have an important influence on delivery outcome. In the present

study, caesarean delivery occurred in 81.8% of women with lower uterine segment involvement compared with 53.1% of those without such involvement, and this association was statistically significant ($p=0.014$). These findings are in close agreement with the study by Lam et al., in which fibroids located in the lower part of the uterus were associated with a substantially higher caesarean delivery rate than fibroids located in the uterine body (86% vs. 40%, $p=0.01$) [14]. Lower uterine segment fibroids may mechanically obstruct the pelvic outlet or interfere with engagement and descent of the fetal presenting part, while cervical or lower-segment lesions may also complicate decisions regarding the route of delivery. Thus, anatomical location appears to be an important determinant of intrapartum management in women with uterine fibroids.

Postpartum haemorrhage occurred in 13.3% of women in the present study, while uterine atony was documented in 10.8% and blood transfusion was required in 7.5%. These findings are consistent with previous literature demonstrating an increased risk of haemorrhagic complications in pregnancies complicated by fibroids. A large systematic review and meta-analysis reported significantly increased risks of postpartum haemorrhage among women with uterine fibroids, with a pooled OR of 2.95 (95% CI 1.86–4.66) [11]. In another study, Lam et al. reported postpartum haemorrhage rates of 22% among women with fibroids located in the lower part of the uterus compared with 11% among those with fibroids in the uterine body, while larger fibroids were associated with progressively greater blood loss [14]. Al Sulaimani et al. also reported significantly higher postpartum haemorrhage among women with large fibroids, with uterine atony being the most frequent cause [13]. The increased risk of postpartum haemorrhage may be attributable to distortion of normal myometrial architecture and impaired uterine contraction following placental separation.

Generalizability

The findings of the present study should be interpreted in the context of its retrospective, hospital-based design and the characteristics of women with uterine fibroids managed at a single tertiary care centre. Although the study provides useful information regarding the relationship between fibroid characteristics and intrapartum maternal outcomes, the findings may not be directly generalizable to women with uterine fibroids managed in other geographical regions, healthcare settings, or populations with different obstetric characteristics. Nevertheless, the study provides relevant insights into the influence of fibroid size and location on mode of delivery and maternal complications. These findings may assist clinicians in antenatal risk stratification, counselling, delivery planning, and appropriate intrapartum management of pregnant women with uterine fibroids.

Conclusion

The present study demonstrates that uterine fibroids are associated with important intrapartum maternal outcomes, particularly an increased frequency of caesarean delivery. Larger fibroid size was significantly associated with caesarean delivery, with the highest rate observed among women with fibroids measuring >10 cm. Lower uterine segment involvement was also significantly associated with caesarean delivery. Labour dystocia, malpresentation, postpartum haemorrhage, and uterine atony were among the important maternal complications observed. These findings emphasize the importance of careful antenatal assessment of fibroid size and location, identification of women at increased risk of labour complications, and individualized planning of intrapartum management to optimize maternal outcomes.

Limitations

The study was conducted at a single tertiary care centre and included a relatively limited sample size of 120 women, which may restrict the generalizability of the findings to other populations and healthcare settings. The retrospective design depended on the accuracy and completeness of existing medical records, and some potentially relevant clinical variables may not have been consistently documented. The study did not include a comparison group of pregnant women without uterine fibroids; therefore, the independent contribution of fibroids to maternal outcomes could not be definitively established. In addition, potential confounding factors such as previous caesarean delivery, maternal age, parity, and other obstetric characteristics may have influenced the observed outcomes. Long-term maternal outcomes following discharge were also not assessed.

Recommendations

Pregnant women diagnosed with uterine fibroids should undergo careful antenatal assessment, with particular attention to fibroid size, number, and anatomical location, especially involvement of the lower uterine segment. Women with large fibroids or fibroids located close to the cervix or birth canal should be considered at increased risk of malpresentation, labour dystocia, operative delivery, and postpartum haemorrhage. Individualized delivery planning and appropriate intrapartum monitoring should be undertaken based on maternal and fetal factors. Adequate preparedness for haemorrhagic complications, including availability of blood products when clinically indicated, should be ensured in high-risk cases. Larger prospective multicentre studies with appropriate comparison groups are recommended to further clarify the independent effect of fibroid characteristics on maternal and obstetric outcomes.

Abbreviations:

CS, caesarean section; GDM, gestational diabetes mellitus; LUS, lower uterine segment; PPH, postpartum haemorrhage; SD, standard deviation; SPSS, Statistical Package for the Social Sciences; USG, ultrasonography; UTI, uterine fibroid.

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Conflict of interest

The authors declare no conflict of interest.

Author contributions

All authors contributed to the conception and design of the study, review of the literature, interpretation of results, preparation and revision of the manuscript. Statistical analysis and interpretation of the data were performed by the designated authors.

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Data availability

Data are available upon request from the corresponding author.

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